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MAGAZINE**

# PC Labs Special Report Micro to Mainframe

INSIDE:  
THE UTILITY  
THAT DOS FORGOT

- 8 2,400-BPS Modems:  
Time to Upgrade?
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Serious Business  
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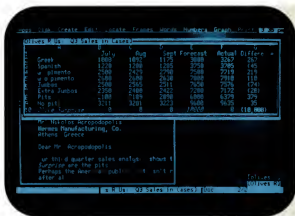
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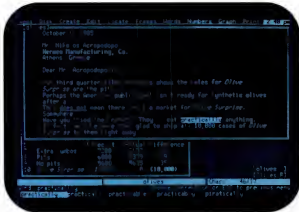
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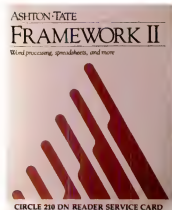
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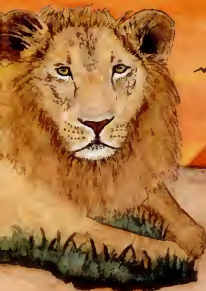
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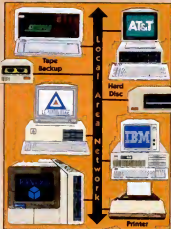
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# WHAT'S INSIDE



You can hardly step into the PC Magazine Labs demo room or walk the floor of a trade show these days without hearing the word *connectivity*. It's not a new coinage, but it's getting more circulation than ever. Like any good buzzword, it means whatever anyone wants it to mean. But the bottom line

is that it's machine-to-machine communications, and that's the theme of this issue.

High on most corporations' to-do lists is micro-to-mainframe communications. Contributing editor Frank Derfler (pictured here) sheds light on this sometimes-arcane subject with a fresh approach and a clever decision aid that gets you thinking about the best solutions to your company's problems. Derfler is no stranger to connectivity issues, having solved such problems for both private industry and government. He also lectures extensively on the subject, including a college-level course.

Derfler's article is the first in a series on this complex subject, but his overview will offer some perspective as you go into Charles Petzold's hands-on review of 3278/79 coaxial terminal emulation boards (page 127). Ace reviewer and contributing editor Petzold puts eight of these potential solutions through their paces. Mainframe computer time continues to be a scarce commodity in most corporations, and PC Labs used more than its fair share of the time on Ziff-Davis's 4341. Sixteen of its ports terminate in the Labs, just enough for our ongoing hardware tests.

If traditional asynchronous communications are more your style of connectivity, you might be interested in assistant editor Chris Johnston's PC News article on low-cost modems. The question, according to Johnston, is, "Have modems become commodity items?" In a sidebar to Johnston's piece, Bill Machrone, who takes his laptop everywhere, explains his enthusiasm for Travel-Comm's diminutive 1,200-bit-per-second modem.

Jon Pepper shifts connectivity into a higher gear as he reviews 2,400-bps modems, comparing the newest releases with the old-timers in this volatile market. Then Petzold connects again in PC Lab Notes with an introduction to asynchronous communications that won't insult your intelligence and won't go over your head. For the occasion, he's written a stylishly lean assembler program that gets you started. Check it out on page 261.

In a completely different kind of connectivity, we discovered that Derfler is a talented lyricist as well as a crack hardware and software reviewer. And he'll go to any extreme to impress us with his talent. Recently he sent us a singing telegram regarding our upcoming series of local-area-network reviews. Beneath the irreverent delivery, his proposal was typically insightful. □

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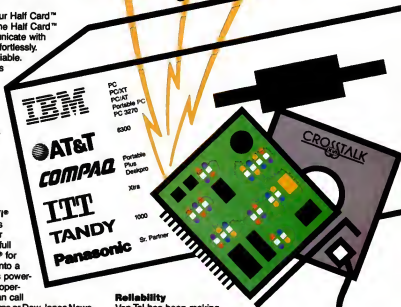
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# LETTERS TO PC MAGAZINE



## SOFTWARE AT THE CENTER

Your recent story "Tape Backup: Measuring Speed and Cost per Megabyte" (*PC Magazine*, Volume 5 Number 3) was informative, especially your thorough de-



scriptions of each unit's software. It doesn't matter how much data a tape unit can back up or how fast if it becomes an ordeal to use. You noted the PC-60 offered special features and high performance but lacked easy-to-use software.

We at Alloy were impressed enough with the PC-60's capabilities to buy the company that developed it, and we are now incorporating its technology into several of our products. But our first move (after renaming it FT-60) was to replace its complex, command-driven software with a menu-driven software interface. We did this because as tape backup technologies move toward an industry standard, the software supplied with the unit is more worthy of user consideration.

Richard A. Gorgens  
Framingham, Massachusetts

## HOME BASE RAISES HACKLES

Richard Aarons's cursory review of *HomeBase* ("The Organizing Principle," *PC Magazine*, Volume 5 Number 3) is worthy of complaint. The omission of such basic facts as the version number re-

viewed, the quality of documentation, and the failure to mention any of the program's limitations was a disservice to your readers. The documentation wasn't even mentioned once in the review. Although \$49 is not a lot of money to spend on a program, it is too much to spend on a program that does not work as advertised.

After testing *HomeBase* (Version 1.03) extensively on an IBM PC with 256K bytes and a clone with 640K, I decided that the program had great potential but was not worth purchasing in its present version. There were too many things that happened unexpectedly (in other words, bugs). Although none were fatal, none of the situations I encountered were covered in the manual. Also, the documentation did not give any indication of program limits. With large notepad files, it refused to load, and an "out of memory" message was given, although CHKDSK revealed over 400K was available. This occurred when running the program in both foreground and background modes.

Aarons did not mention that the program is practically unworkable on a floppy system because of the overlay, which can cause I/O errors. Using a RAMdisk helps make the program workable; or a disk cache can be used to speed things up, but the disk accesses will drive you crazy! For these reasons I cannot recommend Version 1.03 of *HomeBase*. However, I think it has great potential and would definitely recommend the program when the bugs are fixed and the documentation is improved. Wait for Version 2. Quality desktop programs are needed because they can make daily tasks more efficient.

Gordon Nickerson  
Brantford, Ontario  
Canada

Richard Aarons replies:

*Both the Fact File at the bottom of the review and the text itself noted that HomeBase would be a big winner on hard-disk-based systems—not floppies. Our copy (Version 1.05, not 1.03) has 55.8K bytes of on-line help, which is the equivalent of three major articles in PC Magazine, eliminating the need for documentation. With the pulldown menus, it's hard to go astray. Another 20K of highly technical information is in a file on the HomeBase disk, which includes discussions on how to change interrupts in order to avoid conflicts with other interrupt-sensitive software.*

*Amber seems to have a very liberal update policy (\$10 and the old disk), so perhaps, Mr. Nickerson, you should send in your disk. Telephone technical help is free, installation is automatic, and the program itself isn't copy protected. What more could anybody want?*

## WINDOW WORLDS

As an owner of *Microsoft Windows*, I was startled to see you write that the program



multitasks ("Operating in a New Environment," *PC Magazine*, Volume 5 Number 4). My version does not. Since your statement is in the paragraph dealing with problems, perhaps you meant to write that Win-

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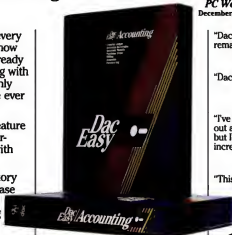
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## ■ LETTERS

*dows does not multitask.*

Vaughn F. Winchell  
Lexington, Massachusetts

*When Microsoft Windows has multiple tasks that want to update the screen, each gets the opportunity. This is not full multitasking, but it's a start.—Ed.*

#### PC AT ROM BIOS SUNDAY DRIVER?

It appears that the information in the sidebar "Making Fast Faster" about speeding up new ATs beyond 6 MHz ("Pushing Your PC Past the Speed Limit," *PC Magazine*, Volume 4 Number 23) is now obsolete. For several weeks, we have been studying that very thing. We now hear that all new ATs (not just 30-megabyte disk models) and replacement motherboards will not run at a faster speed. The ROM BIOS has been changed so that it won't run faster under any condition. If rumors are fact, the AT was tested and built for 8 MHz. Early 80286 chips did not always work at 8 MHz. So, IBM spokesperson Bob Wilson (quoted in *PC News*, "New BIOS Slows AT," *PC Magazine*, Volume 4 Number 26) is not giving the full story when he says the AT was tested and built for 6 MHz. Current 80286 chips run fine at more than 6 MHz.

Is Big Blue protecting a future market for, say, an 80386-based machine running at 8 MHz or better? To us, this would be ethically dubious and the epitome of corporate highhandedness, taking advantage of purchasers who did or would do what IBM didn't. It would be the same as General Motors designing a car in which the installation of a radio other than Delco would disable the ignition—and not telling the customer.

A.C. Bim  
Fort Lauderdale, Florida

#### PROGRAMMING PLEASERS

Both my husband and I enjoy many of your articles and regular columns, but the first place I look every month is the Programming/Utilities column (the second is usually the raccoon painting in the PC Connection ad).

I don't use a hard disk, so many of your recent utilities are beyond my needs (I'll save them for the future), but a number of the programs have proved equally useful

for those of us with floppy-based systems. I have gotten great use out of DOORS, which lets me use both my monitors, and the handy DDIR directory program, but I was prompted to write this letter because of QUICKKEYS.

Last week when I received *PC Magazine*, Volume 5 Number 5, I typed in the QUICKKEYS BASIC listing, ran it off, and added it to several of my disks. I didn't realize what a difference it made until last evening when I booted up my system with another disk, switched to word processing, and found myself wondering why the keyboard, especially the cursor keys, seemed so sluggish. After only a week, I missed QUICKKEYS!

I don't have a technical background, and in the last 2 years I've had to learn care, maintenance, and operation of a microcomputer from the ground up, although it's been a mostly enjoyable adventure. *PC Magazine* has helped with a lot of my questions, and I've recommended it to friends getting into computing. The utilities programs alone are more than worth the very reasonable subscription price.

Kay G. Hudson  
Seabrook, Texas

#### POST OFFICE PAL

You seem to take the U.S. Postal Service to task ("The Postman Wrings Efficiency," *PC News*, *PC Magazine*, Volume 5 Number 5) for stopping a mail carrier from using his PC to keep information about customers on his route. While I grant the system may be more efficient, there are several problems with it that are probably behind the Postal Service regulations prohibiting such a practice.

Postal patrons rely on confidentiality and respect of personal privacy when they use the postal service. Compiling information of any kind could easily lead to violations of that trust. Also, unscrupulous employees could use that information for personal gain, or it accidentally could fall into the wrong hands leading to crimes against the patrons (for example, burglary of vacationers).

Finally, several years ago the U.S. Postal Service paid out millions of dollars in wage settlements for violations of the Federal Labor Standards Act, including one allowing employees to work "off the

clock." Collecting data on a PC at home might fall under that act, and a mail carrier would have to be paid overtime if the U.S. Postal Service sanctioned it.

Peter W. Comerford  
Sacramento, California

#### PRODUCT UPDATES

A more recent picture of the Microsoft Mouse listed in "Building a Better Mouse Interface" (*PC Magazine*, Volume 5 Number 4) is printed below.



*The main difference between the old Microsoft Mouse, on the left with blond friend, and the new one, on the right, is that the keys extend up over the top.*

The price of the McGraw-Hill Interactive Authoring System, Release 3.1, listed in "Creating Corporate Training Courseware," (*PC Magazine*, Volume 5 Number 1) is less than the VASCO Concurrent Authoring System, Release 1.2, contrary to what was printed in the text.

In "Planning Packages Track Your Personal Finances" (*PC News*, *PC Magazine*, Volume 5 Number 4), Andrew Tobias's *Managing Your Money* should have been cited in the caption and in the last paragraph of the text.

#### HOW TO WRITE TO PC MAGAZINE

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## ■ EDITED BY GUS VENDITTO

# PC ADVISOR



*The PC Advisor helps readers choose the hardware and software products that are best suited to their specific needs.*

## EGA IS THE RIGHT CHOICE

I have read and heard speculations that the EGA spec is the new standard for color display. This is very disturbing news since, for the last 3 to 4 months, I have been anxiously awaiting my income tax refund so that I may finally buy a Taxan 640 monitor and a Sigma 400 color card.

My concern is that after spending close to \$1,000 on this new hardware, what good will it be if all the software manufacturers produce software specifically designed for the EGA card.

John Simmons  
New York, New York

*Better to be disturbed before you buy than after. The speculation has come true: EGA is the new standard for color graphics.*

Part of the reason EGA is successful is its compatibility with existing CGA software. Almost certainly, most new software will continue to support the CGA standard, even as it incorporates the EGA's higher level of performance. So, if you must save money and are concerned only with adding some color to a specific piece of software, the system you describe will do a good job.

But to get the most out of your bucks, you'll do better spending a few more dollars now. The Video 7 VEGA board (distributed by Quadram Corp., Norcross, GA 30093; (404) 923-6666; list price \$595) provides everything the IBM EGA does with Hercules compatibility thrown in. IBM's Enhanced Color Display (\$849; available at IBM Product Centers) is a good monitor, as is the NEC JC-1401P3A

Multisync (Elk Grove Village, IL 60007; (312) 228-5900; list price \$799).

*Since these products can often be found at a discount, the extra cost may not turn out to be much at all.*

## USING AN OLIVETTI TYPEWRITER ASA PRINTER

I have an IBM PC and would like to use my Olivetti ET 231 typewriter as a letter quality printer. Who can provide me with an interface?

Albert Schaeffer  
Tucson, Arizona

*Standard RS-232 cable, available at just about any retailer, provides all the interface you need between the serial ports on both machines. Shop around, though, because prices can vary widely; many retail outlets drastically overcharge for this PC lifeline. It's available from the Black Box Catalog (Pittsburgh, PA 15241; (412) 748-5500; part no. 5-EVBSM) for \$20 plus \$8.50 per foot (up to 25 feet).*

*Since you'll be using a serial, instead of the more standard parallel, interface, you*

*should add the following commands to your AUTOEXEC.BAT file:*

```
MODE COM 1:X,N,8,1,P
MODE LPT1:=COM 1:
```

*where X is either 1200 or 300. You'll have to experiment to see which works best.*

## FASTER INDEXING IN DBASE

I am using dBASE II and recently lost a lot of data because of the automatic updating of data files. I have since learned not to have index files open when adding new information. I simply take a few minutes afterward and reindex each index file.

My concern is that I would like to upgrade to dBASE III and would like to know if this problem has been eliminated.

Jim Sharp  
Nashville, Tennessee

*Upgrading to dBASE III will give you much greater speed and extra features. It won't solve this problem directly but will alleviate it. In fact, dBASE II Versions 2.4 and later have a feature (NOUPDATE) that should have been a help but is not. It is added to a REPLACE command but, as a separate reindexing is still necessary after records are added, it's not much of a time saver and was dropped in III. But, since III runs so much faster than II, you should find this chore more tolerable if you upgrade.*

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■ Part of the reason EGA is successful is its compatibility with existing CGA software.

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P1

# Conroy-LaPointe

## ■ EDITED BY GUS VENDITTO

# PC ADVISOR



*The PC Advisor helps readers choose the hardware and software products that are best suited to their specific needs.*

## EGA IS THE RIGHT CHOICE

I have read and heard speculations that the EGA spec is the new standard for color display. This is very disturbing news since, for the last 3 to 4 months, I have been anxiously awaiting my income tax refund so that I may finally buy a Taxan 640 monitor and a Sigma 400 color card.

My concern is that after spending close to \$1,000 on this new hardware, what good will it be if all the software manufacturers produce software specifically designed for the EGA card.

John Simmons  
New York, New York

*Better to be disturbed before you buy than after. The speculation has come true: EGA is the new standard for color graphics.*

Part of the reason EGA is successful is its compatibility with existing CGA software. Almost certainly, most new software will continue to support the CGA standard, even as it incorporates the EGA's higher level of performance. So, if you must save money and are concerned only with adding some color to a specific piece of software, the system you describe will do a good job.

But to get the most out of your bucks, you'll do better spending a few more dollars now. The Video 7 VEGA board (distributed by Quadram Corp., Norcross, GA 30093; (404) 923-6666; list price \$595) provides everything the IBM EGA does with Hercules compatibility thrown in. IBM's Enhanced Color Display (\$849; available at IBM Product Centers) is a good monitor, as is the NEC JC-1401 P3A

Multisync (Elk Grove Village, IL 60007; (312) 228-5900; list price \$799).

*Since these products can often be found at a discount, the extra cost may not turn out to be much at all.*

## USING AN OLIVETTI TYPEWRITER AS A PRINTER

I have an IBM PC and would like to use my Olivetti ET 231 typewriter as a letter quality printer. Who can provide me with an interface?

Albert Schaeffer  
Tucson, Arizona

*Standard RS-232 cable, available at just about any retailer, provides all the interface you need between the serial ports on both machines. Shop around, though, because prices can vary widely; many retail outlets drastically overcharge for this PC lifeline. It's available from the Black Box Catalog (Pittsburgh, PA 15241; (412) 748-5500; part no. S-EVBSM) for \$20 plus \$.85 per foot (up to 25 feet).*

*Since you'll be using a serial, instead of the more standard parallel, interface, you*

*should add the following commands to your AUTOEXEC.BAT file:*

```
MODE COM 1:X,N,8,1,P
MODE LPT1:=COM 1:
```

*where X is either 1200 or 300. You'll have to experiment to see which works best.*

## FASTER INDEXING IN DBASE

I am using dBASE II and recently lost a lot of data because of the automatic updating of data files. I have since learned not to have index files open when adding new information. I simply take a few minutes afterward and reindex each index file.

My concern is that I would like to upgrade to dBASE III and would like to know if this problem has been eliminated.

Jim Sharp  
Nashville, Tennessee

*Upgrading to dBASE III will give you much greater speed and extra features. It won't solve this problem directly but will alleviate it. In fact, dBASE II Versions 2.4 and later have a feature (NOUPDATE) that should have been a help but is not. It is added to a REPLACE command but, as a separate reindexing is still necessary after records are added, it's not much of a time saver and was dropped in III. But, since III runs so much faster than II, you should find this chore more tolerable if you upgrade.*

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## RUN/C PROFESSIONAL VERSION Interpreter Now Accesses Binary Libraries

**R**UN/C was an innovator for converting inaccessible compiled C to an interpreted language for easy to grab hold of as BASIC. Great for learning, a problem solver for those who interpret expects nothing but source code, and that put the vast resource of professional libraries off limits.

No longer. RUN/C Professional™ has the tools dynamically to load and unload multiple binary function libraries while in its interpreter. Your code can now reach for functions in the commercial C libraries like C-Font, Stringword™, C-Opus™—potentially any library compiled with Lattice's large model. How? The manual shows how to develop the interface to a library, using the Lattice compiler (a must). How about your own archive of functions? No reason why not.

### The RUN/C Interpreter

The interpreting engine lies at the heart of both the improved original RUN/C and the new Professional version. Its creators had the inspiration to make once formidable C behave on screen much like PC BASIC with a full-screen editor like WordStar™. Just create a program and RUN it. If it stumbles, USE it, EDIT it, add lines, delete lines, RUN it again, fix it, and repeat. Use familiar commands like LOAD, MERGE, SAVE, FILES, even TRON and TRACE, and a file profiler.

RUN/C is ideal for rapid program development. Put up code at high speed, tinker and re-arrange, try out things dead may-care, and let RUN/C find your typos and malprograms.

RUN/C has a treasury of functions built into the interpreter—over 100 paralleling the most used functions found in a standard computer library. So when and if the time comes to compile, your source code will find counterparts.

There are lots more features—system interrupts, a shell command to invoke any operating system command without leaving RUN/C, even the ability to load a preferred editor in parallel and switch back and forth.

### RUN/C Standard Version

Straight RUN/C has all above but the Loadable Library™ linking mode. It utilizes source code only, whether created by its own editor, or from any ASCII file, such as programs you've directly written, or commercial libraries which supply source code.

It makes a splendid teacher. The manual has not just instructions how to use RUN/C, but on 500-plus pages provide a thorough-going demonstration of the C language itself. Every feature, of C or RUN/C, is accorded its

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own macro-chapter. Over 100 of these chapters are devoted to RUN/C's built-in functions, and every one lists a sample program showing how it is used. The programs are also on the disks. So as you read them in the manual, you can run them on the screen. (Needs 180K-256K recommended.)

### RUN/C Professional

RUN/C Pro has every feature of RUN/C regular plus the binary library link-up and an extra level of debugging aide. They are ingeniously installed both in a built-in function, so you can call for debugging conditionally. The called function paints a menu of debugging tools to choose from, including immediate mode to display variables, single-step tracing, and changing of variables.

RUN/C Professional can tackle projects of any size. Use it as a creative front end to feed a continuous stream of source code into compiled modules. Only the source work in progress is still interpreted; the finished modules will whiz by at object speeds. It will change how you work. (32K minimum and 512K recommended to libraries.)

RUN/C, quite a run for your money.

Code	Product	Price	PC Brand
S0910	RUN/C	\$120	\$109
S0950	RUN/C Pro	\$250	\$199

## The GSS GRAPHICS SYSTEM

Leave the Driving to GSS

ANSI CGI STANDARD

**G**SS™ has reconfigured two components of its comprehensive graphics tools to conform with the more advanced ANSI Computer Graphics Interface (CGI) standard.

At the heart of the system is now the Development Toolkit which contains all language interfaces and device drivers for keyboards, mice, joysticks, tablets, printers, plotters, cameras, and more. Devtools house all management of vector graphics (plotters) and bitmaps used by raster input devices (scanners) to insulate completely the application program from concerns for device algorithms. No one has implemented CGI that way. It means programming remains generic, just switch drivers and the same program will drive a different device, including intelligent controllers which do not want micro instructions.

GSS Kernel™ conforms to level 2b of ANSI's Graphical Kernel System (GKS). It needs no 32-bit AM drivers and language bindings. Kernel has macro level tools to draw and color an object, store the sequential instructions, and increase the object as desired, as well as segment it, transform it, etc., all the while returning data on attribute settings, system, and device status. So powerful, a single command may zoom 32 AM drivers and object lower level statements.

Plotting has the equivalent GKS tools for graph and chart generation and their cap-

**L**attice has labored and come forth with the long-awaited Version 3.0 of its top-model compiler. A long list of enhancements, adoption of the ANSI draft standard, documentation revised by law, and add-on libraries matched by none in sheer quantity restore Lattice C™ to its leadership role as the C compiler to beat. Lattice now embraces key UNIX™ enhancements which have entered the language since Kernighan & Ritchie, void functions returning no value, enumerated data types to assign stepped values to variables, the ability to pass data between structures by assignment statements. And 3 C decks checking of external function arguments by data type as proposed by ANSI to keep bug dreams when modules join up at link time.

The greatly expanded libraries, now comprising 385 functions, enable the file sharing and record locking provisions of DOS 3.1, provide a full complement of transcendental, and a host of utilities to mimic the UNIX and XENIX™ environments.

Lattice now delivers smaller EXE files, crump one past compiler, boasts very fast link times and a more efficient aliasing algorithm.

The compiler now defaults to the ANSI proposed standard when you need a strict mistress, but command line options tolerate straying. New options generate code to use 80186 and 80286 features, and the

8087 is of course sensed and utilized if aboard.

Lattice has enjoyed pre-eminence so that the developers have created their own tools to marry into Lattice C than any other compiler. Programmers now have an enormous resource of libraries and utilities to use with Lattice to speed their work. William Hunt, in his exhaustive analysis of 15 compilers in the 1/81 issue of the PC Tech Journal awards Lattice the only "very good" rating for add-on library availability. He sums up with this accolade: "a fine product to consider for the production of important applications."

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**T**he hearty implementation provides a real alternative to technical languages like C. It melds the most useful features of C Pascal, and Modula 2 into BASIC, while retaining the familiarity of a language already known to millions. And new Version 2.0 is 100% compatible with Microsoft's GW™ BASIC and IBM BASIC, including graphics, sound, and assembly language calls. Fast load old programs and run. Save and they are converted to Better BASIC.

It's big: Better BASIC's hugely expanded features require 192K, your programs can go all the way to the PC's full 640K. It's comfy: Behaves like Microsoft BASIC at the interactive level, with a full-screen editor, direct statement execution, and always prompt to RUN. It's fast: 86 is an enormous compiler—unlike with user-programs each statement is checked and compiled just once. The Same benchmark runs six times faster than with Microsoft.

Better BASIC™ has C-like structures for reference to entire records, so any goodbye to FIELD, MIXED, CVD, LSET, etc. its "procedures" summoned by name unlike C-GS. Lots more features built on liner for compiled modules, trace, debugging breakpoints, cross-reference command, 32K strings, DOS and BIOS calls and interrupts, recursive.

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## PROBLEM: Handling your need for more megabytes, without spending megabucks on a new drive.

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The 10MB drive that once seemed enormous is now jammed with important files. That 20MB that should have lasted years is crowded in a matter of months.

Of course you could keep buying bigger hard drives. Or you could get Cubit and get the maximum storage space from the drives you already have.

#### What is Cubit?

In brief, Cubit is an advanced software tool that automatically reduces the number of bytes required to store a file, then converts the file back to its original size when retrieved. Some programmers call this effect "data compression," others, "disk expansion." Either way, the result is the same.

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Best of all, you'll be using the same fast, reliable data compression techniques used on mainframe computers for decades.

#### How much disk space will you save?

Because the vast majority of data created on PC's is standard ASCII text—letters, numbers and other English language symbols—we've optimized Cubit for word processing and database files. With these, you'll get a minimum of 50% expansion on up to a full 100% or more.

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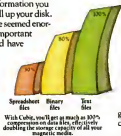
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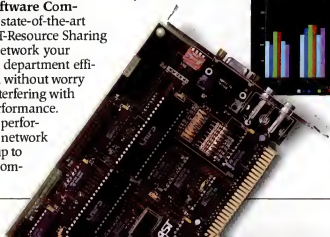
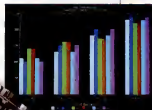


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1. Follow instructions on the other side

Back

0018-back-0018



Inverted Back

1. Follow instructions on the other side

Folded edge of the page



GbsSlipSheet-001



Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
  1. Front side touching the free page
  2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Open the foldout page
2. Insert this sheet with
  1. Front side touching the free page
  2. Arrow pointing to the fold
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*"The market leader in PC-to-System 34/36/38 communications - it's AST, they've got the most comprehensive product line and they've got a large installed base."*

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strong enhancement prod-  
ucts for Apple, AT&T and  
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*"And their technical success  
is recognized. AST has  
developed custom OEM  
products for leading PC  
manufacturers."*

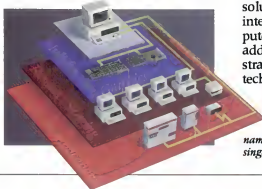
gateways, allow more effective use of your existing office resources. We also provide IBM-compatible disk subsystems, such as our AST-4000™ which features a 74 Mb capacity and SCSI architecture, and system security products for use in single-user and shared environments.

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ment products in use worldwide, the AST  
name brings increased PC power to users in both  
single PC and shared PC environments.*

*"They're known for their quality. Over one million PCs now use AST products, and their return rate is consistently one of the lowest in the industry."*

*"They're worldwide too. AST has two international subsidiaries, one in Hong Kong and another in the U.K."*

have a comprehensive line of 3270-compatible SNA, Bisync and Coax communications products as well as batch-mode 3770 and 3780 products, including clusters and gateways. And a nice selection of internal and external

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*"Our company is using the AST-5251/11 Plus" to directly connect our PCs to our System /36s and /38s."*

*"And AST now has a complete line of 5250 companion products."*

*"... Our company has installed AST's 3270 and 3770/3780 emulation solutions for mainframe communications."*

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connection using standard twinax cable. Our Hot-Key support provides a toggle between PC DOS and multiple host sessions, and you can work with up to seven of these sessions concurrently by switching between them with a simple key-stroke. We include bidirectional file transfer support so you can move host data to and from your favorite PC application software files, and other exceptional features like automatic 34/36/38 sign-on with password security, keyboard mapping help and support for multiple 5224, 5225 and 5256 printers.

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Used with either AST-5251/11 Plus,

AST-5251/11 or AST-5251/12, our AST-5250/Display" adapter provides Model 11 attributes and standard IBM PC monochrome display capabilities. Our AST-5250/Display-C" adapter offers IBM 5292 Color attributes and standard IBM PC color graphics. And our AST-5250/Cluster" lets you share one host connection with several serially-attached PCs.

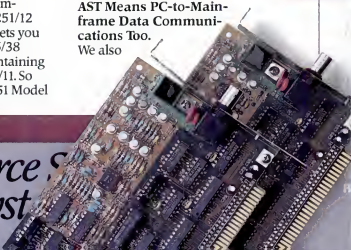
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# PC NEWS

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## Lower-Cost Modems Place Price Pressure on Hayes

### PC ANALYSIS

1,200-bit-per-second modems sell for as little as \$159, compared with Hayes's \$489. But is the quality there?

BY CHRISTOPHER JOHNSTON

The few companies in the microcomputer business dominant enough to set standards often find themselves under pressure from lower-cost compatibles. IBM's PCs have competition from dozens of cheaper compatibles. Hayes Microcomputer Products faces a similar challenge.

By coupling the industry-standard "AT" command set that Hayes pioneered with low cost and generally acceptable quality levels, competitors are making inroads on Hayes's turf. Has the competition hurt? Hayes recently laid off 125 of its 800 employees, though the Norcross, Ga., company firmly says the reductions were the result of overstaffing, not competition.

#### 1,200-BPS Modem: \$159

PC Magazine found ten Hayes-compatible 1,200-bit-per-second modems for \$250 or less, with the cheapest at \$159. Also available: four 2,400-bps modems for \$500 or less, with the cheapest at \$299. Hayes sells its 1,200-bps internal and

external modems for \$489 and \$599 list, respectively; the 2,400-bps modems are \$799 and \$899 list.

Such comparisons are misleading because the lowest-cost modems are generally sold by mail-order at list price, while Hayes modems can be bought at a substantial discount. The street price of the \$489 1200B internal modem is as low as \$289.

Internal modems are less expensive because they cost less to make; no case or transformer is needed. Most makers back them with 1- to 5-year warranties and include software. Hayes offers 2 years and Smartcom II with in-

(continued on next page)



Illustration: Joe Weisman

## Toshiba Puts PC Power In a 9-Pound Package

### PC FIRST LOOK

The Toshiba T1100, with a 3½-inch drive, is the lightest PC-compatible yet.

BY CRAIG L. STARK

Frequent travelers find portable computers about as easy to manage on trips as small children. The recently introduced Toshiba T1100 laptop proves,

however, that it is possible to design a machine for those on the go that combines reasonable weight and functional computing.

Weighing in at 9 pounds (the lightest weight for a PC-compatible) and measuring 12 by 12 by 2½ inches, the \$1,999 T1100 really lets you work at the keyboard while on a train or plane or in a crowded lecture hall. Its 512K-byte memory gives you ample program and data space—enough, indeed, to devote a considerable chunk to a



Most any non-copy-protected program can be transferred to the 720K-byte internal disk of the \$1,999 Toshiba T1100. An external 5¼-inch floppy that reads and writes IBM formats is \$529.

RAMdisk. That's important to the impatient, as it lessens their dependence on the rather leisurely access time of the

(continued on page 43)

Photograph: Thom O'Connor

## Lower-Cost Modems

(continued from preceding page)

terminal modems.

The current price leader is PC's Limited of Austin, Tex., at \$159 for an internal 300/1,200-bps modem without software. Most others are in the \$200 range.

How good are the Hayes-alikes? In many cases, construction levels don't match Hayes's.

### 2,400-BPS Modem: \$395

Among 2,400-bps modems, the best bargain is from Qube, the planned May 1 release of an as-yet-unnamed 2,400-bps external unit for \$299. Next are the solidly built \$395 CTS 2,400-bps internal and external units. (For a review of the CTS 2424ADH and seven other external 300/1,200/2,400-bps modems, see "2,400-BPS Update: 8 Modems for a New Standard" on page 229.)

Price competition already forced one player from the 2,400-bps market. E&E Data Comm of San Jose, Calif., announced the Avatex 2400 half-card unit last year at \$459. When CTS got in the market, E&E got out. Says Armando Garcia, vice president of marketing: "We looked at the marketplace, and, when 2,400-bps modems started coming out at \$395, we decided not to go ahead with the product for now."

Although Hayes reduced its staff by 15 percent on February 7, spokesperson Garry Betty explained the move strictly as a

## Low-Cost 1,200- and 2,400-bps Modems

Company	Product	Speed (bps)	Type	List price
ComData	212E2-32	1,200	External	\$157
PC's Limited	Short Modem	1,200	Half card	\$159
Transend Corp.	PC Modem Card 1200	1,200	External	\$169
Qube Distributing	PC212A/1200	1,200	Internal	\$179
ComData	1200	1,200	External	\$187
E & E DataComm	Avatex 1200	1,200	External	\$199
ABM Computer Systems	Bright Modem	1,200	Half card	\$199
Practical Peripherals	Practical Modem	1,200	Half card	\$199
Qube Distributing	212A/1200E	1,200	External	\$199
Everex Systems, Inc.	Evercom	1,200	Half card	\$249
Hayes	Smartmodem 1200B	1,200	Internal	\$489
Hayes	Smartmodem 1200	1,200	External	\$599
Qube Distributing	TBA	2,400	External	\$299
CTS Datacomm	Half-Pak #24	2,400	Half card	\$395
CTS Datacomm	2400 Series	2,400	Internal	\$395
ComData	224E2-42	2,400	External	\$457
Hayes*	Smartmodem 2400B	2,400	Internal	\$799
Hayes	Smartmodem 2400	2,400	External	\$899

\*Hayes 2400B internal is \$799 with Smartcom II, \$739 without.

The table lists 1,200-bps modems available for under \$250 and 2,400-bps modems available for under \$500. All claim Hayes compatibility. Also shown, for price comparison, are Hayes Smartmodems. Most internal modems include software.

cost-cutting measure. "We had staffed to levels we couldn't support with our present revenue. We had fewer than 200 employees in December 1983. We grew to 585 by December 1984, then to about 800 in December 1985.

"We haven't seen any effect [from low-cost competitors] on our primary retail markets. In fact, we've seen significant growth for our 2,400-bps modem," says Betty. "The competition is selling to people who wouldn't have otherwise bought a modem."

A marketing manager for an Atlanta area high-tech firm agreed that overstaffing was the main problem at Hayes. "Hayes just got too fat," he insists. "If Hayes has competi-

tion, it's from companies that beat Hayes by \$100 to \$200 on price, such as Ven-Tel, U.S. Robotics, or Microcom, not competitors who sell for 50 percent less."

Touchbase Designs markets a 1,200-bps unit the size of a cigarette package.

Reduced chip count is one factor in reducing costs. Xecom of Milpitas, Calif., has a 1,200-bps MOSART (modem synch-

ronous/asynchronous receiver/transmitter) voice data modem that's housed on a single chip. (The current version is not Hayes-compatible, however.) Xecom's CEO, Alan Gregory, says the MOSART chips are already popular among OEM motherboard manufacturers. Gregory predicts that OEMs "in high-volume OEM quantities will break the \$100 barrier by the beginning of 1987."

## NEWS IN BRIEF

**New York**--IBM quietly released DOS 3.2 on March 18. For \$95, users get all the functions of DOS 3.1 (\$85), plus support for the IBM token-ring network, 3.5-inch floppy disks, a new REPLACE command that replaces (updates) copies of a file in all disk subdirectories, and an XCOPY command that copies files selectively or by date and allows copying from more than one subdirectory. To make accidental reformatting of a hard disk more difficult, DOS 3.2 removes the default drive capability in FORMAT and checks for labels--an indication that the drive is formatted.

What 3.5-inch drives does DOS 3.2 support? No comment, said IBM in late March.

Earlier, IBM cut IBM-to-dealer prices by 20 percent on the PC but not on the XT or AT, leaving it to dealers to decide whether to pass the savings on to customers. Steve Malisewski, vice president of marketing for MicroAge Inc., believes the dealer cuts are a move to protect dealers from gray market competitors and predicts further cuts on other IBM products. "This may offset the

## The Hayes "AT" Standard

What is a Hayes-compatible modem? To most people, Hayes-compatible means a modem that understands the "AT" command set and/or runs software designed for the Hayes Smartmodems, such as *Smartcom II* and *CrossTalk*.

Hayes modems know that a capital AT means "Attention, modem" and that what follows is a command for the modem, not data to be passed through. For instance, AT DT 9, 555-1212 dials directory assistance (using tone dialing) from an office phone.

Modems don't have to be the Hayes brand or even Hayes-compatible to talk to each other, but because more software is written to the Hayes standard, most buyers specify Hayes compatibility. For more on modem basics, see "Choosing and Using Modems," PC Lab Notes, *PC Magazine*, Volume 5 Number 8, and "Paring Communications to the Bare Essentials" in PC Lab Notes in this issue, page 261.

—Bill Howard



## Toshiba

(continued from page 41)

T1100's 3½-inch, 720K floppy disk.

### LCD Display: 25 by 80

The liquid-crystal display is no better or worse than most of its breed, but at least you can find a readable tilt angle, and the screen does present an 80-column by 25-line display. Since it puts a standard 640 (or 320) by 200 pixel resolution in an 8½- by 3¼-inch viewing area, the aspect ratio is horizontally splayed for graphics, but this is hardly a major flaw in a laptop machine.

The T1100's keyboard is better than one expects in a laptop. Touch-typists will rejoice that the keys are full size with standard ¼-inch centers and have "homebase" dimples on the F and the J keys. Even if the touch is slightly lighter and lacks the "click" assurance of a PC keyboard, the T1100's keyboard has a conveniently long throw with good overtravel.

### External 5¼-inch Drive

Support is provided for a parallel printer, an external RGB monitor, and either of two Toshiba-built devices for relating

to the normal 5¼-inch disk world. One is a \$99 Floppy Link plug-in card for the PC that connects to the T1100 via a cable for off-loading. The other (\$529) is a cable-connected, 5¼-inch standalone disk drive unit that operates from a regular

AC wall outlet via the T1100's 18-watt battery recharger.

An optional plug-in board (\$249), with remarkably clear installation instructions, is available to supply a serial interface, a built-in clock, and a 300-bit-per-second modem. A 1,200-bps unit is said to be in the works.

Having lugged it both cross-country and on daily crosstown trips for several weeks, I've come to appreciate the shoulder strap on the Toshiba's padded vinyl, Totes-style carrying case. Unlike most laptops, the T1100 is genuinely easy to carry, and it's run everything I've

thrown at it, from *Flight Simulator* to *xyWrite III*. It's said that even I-2-3 can be made usable on the T1100, though no 8087 support is provided for the handful of programs that require it. The *Norton Utilities*' SysInfo gives the machine a 1.0 computing speed, exactly equal to the standard IBM PC's.

Whether the small size, high-capacity 3½-inch disk format of the Toshiba T1100 laptop is a blessing or a nuisance depends on how often you translate media and on how seriously you depend on copy-protected programs you can't break from their 5¼-inch formats. [E]

## PC FACT FILE

### Toshiba T1100

Toshiba America Inc.  
2441 Michelle Dr.  
Tustin, CA 92680  
(714) 730-5000

List Price: \$1,999 with 512K RAM, one 3½-inch disk drive, AC adapter, battery pack; Floppy Link plug-in card, \$99; external 5¼-inch disk drive, \$529; clock, 300-bps modem, serial port, \$249.

In Short: A 9-pound laptop (25 by 8½ LCD screen) good for 6 hours per charge of PC-compatible on-the-go computing. The T1100 runs most every non-copy-protected PC program you can transfer to its single 3½-inch floppy disk.

CIRCLE 810 ON READER SERVICE CARD

## TravelComm 1200: A Traveler's Companion

### PC FIRST LOOK

BY BILL MACHRONE

Touchbase's TravelComm 1200 modem is a paragon of portability. This shirt-pocket-sized package works at both 1,200 and 300 bits per second. It runs on a single 9-volt battery and includes tone dialing and call-progress detection. The TravelComm 1200 plugs right into the back of your portable computer (or, if you desire, a PC) via a standard 25-pin RS-232 connector. It turns itself on when it senses activity on the port, and switches off when it detects a dropped carrier or when you issue a disconnect command.

You can tone-dial simply by sending a couple of carriage re-

turns and typing numbers on the keyboard. There is no pulse dialing option. As soon as the TravelComm 1200 detects a carrier, it switches over from dialing mode to communications mode. There is no built-in speaker, so operation is completely silent. The call-progress light flashes for a busy signal and remains steady for a dial tone.

### A Genuine Timesaver

In use, the TravelComm 1200 is just about perfect. Once you get used to watching the call-progress light, you don't miss the speaker. It's a delight and a genuine timesaver to negotiate MCI Mail at "office" speeds when I'm out on the road. In one instance, though, a too-loud internal dial tone in a hotel swamped the receiver circuit, and the modem mistook it for a 1,200-bps carrier. Even that was no problem, other than filling the screen up with garbage until I dialed from the phone instead of the modem.

Since this is an originate-only modem, there is no need for the Hayes command set. Its ability to distinguish between dialing and communications is intelligence enough.

For more information about the TravelComm 1200, contact Touchbase Design at 1447 S. Crest Dr., Los Angeles, CA 90035; (213) 277-1208. [E]



The \$299 Touchbase TravelComm 1200 modem weighs but 6½ ounces and plugs directly into the back of a laptop portable or PC, drawing power from the computer. It measures 4 by 2½ by 1 inches.

## ■ CHRISTOPHER JOHNSTON

cost of training, market research, and direct promotional activities," he says.

PC's Limited suspended shipment of its \$1,995 PC's Limited AT on March 14 because of the lack of FCC certification. Michael Dell, chairman of the Austin, Tex., mail-order firm, says problems lay in the certification process rather than in the machine itself. Dell says the company expects to get certification and resume shipments.

With the Japanese yen gaining 30 percent against the U.S. dollar since last year, the prices of Japanese-made PC compatibles and peripherals may be going up. Epson America hiked prices 5 to 15 percent on six printers. Others are watching and waiting. Tom Bongiorno, director of marketing for Ster Micro Inc., another Japanese printer manufacturer, says, "We're trying to find out where the yen will stabilize before we make a price decision."

No comment on price plans from IBM for its products with Japanese components.

# ANOTHER 200,000,000 REASONS TO DUMP YOUR OLD PRINTER.

ered print head will last for over 200,000

If you're getting a little tired of buying new print heads for your old PC printer, don't.

Buy a printer with a better print head, instead.

Namely, the Alps P2000™ Dot Matrix Printer.

Its precision engineered print head will last for over 200,000,000 characters. Or twice as

long as many others.

But there's more to the Alps P2000 than just a better print head. It's a better printer. With normal care, it'll run five or more years without a breakdown.

What's more, it'll run circles around its competition. It prints drafts at 250 characters per second (cps). Memos at 125 cps. And near letter quality





documents at 50 cps.

It prints everything from letters to graphics to 16-inch-wide spreadsheets, all in a variety of type fonts and sizes.

And its paper-saving push/pull tractor feed makes easy work of multiple forms printing.

Best of all, the Alps P2000 is fully compatible with all the most popular business PCs and software.

We could run on and on, but we'll leave that to the Alps P2000.

For our brochure and the name of our nearest dealer, please call (800) 828-ALPS. In California, (800) 257-7872.

Then, the next time you need to replace your print head, replace your printer instead.

**ALPS**  
AMERICA

# Borland's Traveling SideKick: Tsk, Tsk

## PC FIRST LOOK

BY STEPHEN MANES

What weighs 3 pounds—including a microprocessor and graphics output device—but requires a standard three-hole punch for normal operation? *Traveling SideKick*, Borland's \$69.95 self-proclaimed "Organizer for the Computer Age."

*Traveling SideKick (TSK)* is not exactly high tech. The microprocessor is a Hong Kong-made solar-powered four-function calculator. The "graphics device" is a roller ball pen. The punch (not furnished) is to get the software's output—standard 8½- by 11-inch sheets user-folded not quite in half—into the IBM-size binder (leather for reviewers; vinyl for the masses).

The binder also includes pre-printed any-year daily, weekly, and monthly calendar forms, address forms, and multipurpose forms (six-month refill, \$29.95). You also get 1986-through-1988 calendars, two pages of national and international area codes, one page of toll-free telephone numbers, a metric conversion table, an A5-C11 table, gatefold color maps of the United States and the world, a "sturdy" (but not Tyvek) envelope for receipts and such, a set of quick-reference guides to Borland products, and, of course, the *TSK* program disk.

### Supplement to SideKick

The non-memory-resident software is essentially a database and report generator intended to supplement regular *SideKick*. Its main job is to format, print, and otherwise transform data from *SideKick* appointment and address files into ready-to-punch pages on plain paper.

*TSK* lets you examine, modify, and search through calendar and address files via a split-dis-

play with a data-form window on top and a browsing window reminiscent of *SideKick*'s dialer below. The record highlighted at the bottom appears on top for potential modification, and search functions allow you to home in on a particular item. Alas, the key assignments for searches contravene *SideKick*'s dialer conventions.

### Calendar Limitations

*TSK* accepts the limitations of *SideKick*'s calendar. You still can't include any times before 8 a.m. or after 8:30 p.m., use odd time increments, or have more than 26 characters per half-hour slot. You can't automatically enter recurring engagements like that Thursday therapy session, or copy birthdays from year to year. Also, the calendar's sneaky ways of making entries disappear have not been tampered with.

But those who use the calendar may like *TSK*'s ability to format its files into daily, weekly, monthly, or annual summaries. *TSK*'s daily printout puts one column in the upper-left-hand quadrant of the page, leaving the rest for notes. Priority appointments get asterisks in the first column.

The weekly calendar prints up to seven engagements per weekday and two apiece for Saturday and Sunday, and the monthly form includes only the first nine characters of up to three appointments per day. In both cases, nonpriority items don't appear at all, and the word *more* prints out at the bottom of an overstuffed date. The yearly calendar simply prints an asterisk beside each date with a priority entry.

*TSK*'s addresses facility works only with data structured in one predefined form: an "initial" field and fields for name, company, address (2), city, state, ZIP, country, telephone number, and remarks. Each field's length is fixed, and none

is longer than 26 characters. That's a problem even in the sample file Borland supplies, where part of a company name is entered in the "address 1" field. Long-distance service users may discover they can't cram in all the characters needed to use *SideKick*'s dialer. A conversion program is supplied to help massage files into *TSK* form, but it does not work as documented and not at all on files with single-line records longer than 78 characters.

*TSK* can sort its address files only on the name, company, and ZIP fields, so you must enter last names first if you want the usual order. But then there's no way to print labels with first name and last in proper sequence. At print time, you can choose between single- or multicolumn labels and address or phone list formats, and you can select criteria to restrict printed reports. But there's no way to select a range of values. Operators such as "greater than" are unavailable, as are multiple criteria and wildcards within a field.

### Borland's Way

The address book insists on including blank lines, producing unsightly holes in the middle of many entries. The label generator omits blank fields but is inconsistent about the formatting of state and ZIP codes. Three printer drivers are supplied: Epson, claimed to work on FX-80 and FX-85 models but not MX-80s; IBM, for "any

printer that emulates the IBM character set," and "generic," for everybody else. Output differences are apparent mainly in the border rules. Fortunately, printer setup and shutdown strings of up to five characters that can be sent automatically, and all output can be saved to disk rather than the printer for later fine-tuning and output.

As usual, Borland allows user customization of numerous defaults from screen color to date format. It can even be set up to work automatically with *SideKick*'s default appointment and phone files. But in too many important areas the program forces you to work its way or not at all.



FACT  
FILE

*Traveling SideKick*  
Borland International  
4585 Scotts Valley Dr.  
Scotts Valley, CA 95066  
(408) 438-8400

List Price: \$69.95; \$125 including *SideKick*, Version 1.5; form refills, \$29.95

Requires: 256K RAM, three-hole punch.

In Short: Limited database and report generator for *SideKick* with binder, maps, address and calendar forms, calculator, and pen. Perhaps not Borland's finest hour. Not copy protected.

CIRCLE 624 ON READER SERVICE CARD



*Traveling SideKick* provides a database and report generator for *SideKick*. The \$69.95 utility includes binder, calculator, pen, calendar and address forms, maps, and area-code lists.

**ON  
BOARD 20**  
Hard Drive Card

**ON  
BOARD 10**  
Hard Drive Card

Maynard Electronics

# A Hard Drive The Easy Way.

Turn your PC into an XT in seconds with OnBoard, Maynard's new hard drive card!

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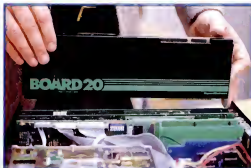
Well, relax. OnBoard is here. The hard drive card that boosts your PC's storage capacity to rival any XT or AT\* on the block! OnBoard snaps easily into one of your IBM PC's expansion slots! Open your PC, plug in OnBoard, and close your PC. Just like that. Your PC will boot directly to OnBoard when you power up — no more floppy disk maneuvering.

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Simply snap OnBoard into expansion slot 1 of your IBM PC\* or XT, leaving all your other slots free for additional boards.

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\*IBM PC, XT, and AT are trademarks of International Business Machines.  
CIRCLE 475 ON READER SERVICE CARD



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460 E. Semoran Blvd., Casselberry, FL 32707 305/331-6402

# Now, The First Name In Tape Makes Backup Second Nature.



## A fail-safe, shirt pocket solution.

Introducing our new family of micro tape drives. They put more data on a business-card size tape cartridge than 99% of PC users have on their hard disk—20 megabytes.

One model tucks inside your PC. The other sits next to your monitor, in a sleek "zero-footprint" enclosure.

Both employ BackTrack™ software that automatically copies your hard disk data onto tape throughout the day. So you're never more than a few minutes away from your most current data.

And both are available with a companion 25 megabyte hard disk,



*Breakthrough: We store 20 megabytes of backup on this tiny tape cartridge, with legendary Tullgrass simplicity and reliability.*

**I**f it can go wrong it will. Probably at the worst possible time. That's The Way Things Work. It's a never-fail Rule of Nature.

Fortunately, we humans have learned to live by a corresponding and offsetting second Rule: Never work without a net. Always carry a spare tire. Bring two Number 2 pencils.

The Tullgrass Corollary for Personal Computer users: Never—not ever—fail to make a backup copy of your important business information.

We've preached backup all along. Now we've done something about it that makes backup more practical than ever.

*How should you feel about tape backup? Take the spare tire out of your trunk for a month and see if that bothers you.*

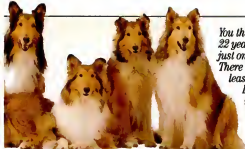


**TG-1020i:** Half-height internal 20-megabyte tape backup system for PC, XT, AT and compatibles.

**TG-2025i:** Internal 20-megabyte tape backup system mated with 25-megabyte hard disk for PC, XT and compatibles. Half-height AT&T/Olivetti model available, too.

*December 30, 1978: Danny White comes in as Quarterback when Roger Staubach is knocked unconscious, and leads the Dallas Cowboys to a come-from-behind 27-20 playoff victory over the Atlanta Falcons.*





*You think they filmed  
22 years of Lassie with  
just one dog? Never.  
There were always at  
least two backup  
Lassies  
in the  
wings.*



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HIDE-A-KEY

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If you're buying a new system, insist  
on built-in backup. Before some-  
thing goes wrong.

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move, dial 1/800-228-DISK for the  
name of the Tallgrass dealer near-  
est you.

And don't forget to check your  
spare.



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of micro tape drives, avail-  
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or packaged in a new zero-  
footprint enclosure.*



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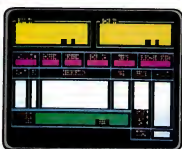
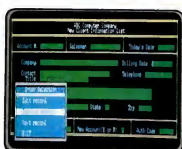
11100 West 82nd St., Overland Park, KS 66214



*There's  
never been an  
unsinkable ship. And  
they haven't yet built a  
personal computer that  
wasn't prone to losing  
data now and again.  
Just think of Tallgrass  
as your PC life  
saver.*



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Cary N. Prague, Author  
"Beyond programming with dBASE III"

"Destined to replace QUICKCODE™"  
MicroNews/Views, Nov. 85

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Move pieces of the screen around, select colors from a menu, draw boxes and lines, paint, repeat last character in any direction. And more!

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For BASIC, Turbo Pascal, IBM/Microsoft Pascal. \$125.

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CIRCLE 530 ON READER SERVICE CARD



# Superior Quality in Star, Toshiba 24-Pin Printers

## PC FIRST LOOK

BY WINN L. ROSCH

The Star NB-15 and the Toshiba P321, members of the new generation of 24-pin dot matrix printers, promise and deliver the best of two worlds: speed and quality. By shrinking their 24 print wires to just twice the thickness of a human hair, they achieve on-paper quality that, for many users, is acceptable for business letters or manuscripts. And because these machines are still dot matrix printers, their graphics abilities are not compromised; rather, they are enhanced by using 24 rather than 9 print wires.

The P321 is above all a robust printer. Although it sports only a 9½-inch carriage, it has a typewriter-style friction feed with a big rubber roller/platen (a tractor feed is optional), a heavyweight printhead, and large motors.

Toshiba bills the \$699 P321 as a "three-in-one" printer because it combines draft, letter-quality, and graphics abilities. As a character printer, it is compatible with Qume Sprint 11 commands and offers propor-



Print quality of the \$699 Toshiba P321 is reminiscent of the faster, wide-carriage Toshiba P351 at \$1,895.

tional spacing with refinements only a dot matrix printer can add—pitches and print quality selectable by software commands. It also has a cartridge slot for adding extra typefaces.

### Draft Mode: 76 cps

Although the draft printing speed of the P321 is modest—76 characters per second on the PC Magazine Labs' standard business-letter benchmark—its quality is darker, sharper, and more readable than that of most dot matrix printers

(just like its heavyweight sibling, the P351). At 42 cps, the letter-quality speed is in the same league as that of daisy wheel machines and has a quality like that of a pre-Selective IBM typewriter with a fabric ribbon.

The P321 can handle Qume Sprint-11-style, single-dot graphics (slow and ugly), block graphics (fast and ugly), and dot-addressable or bit-image graphics (slow and sharp at 80 by 180 or 180 by 360 dots per inch). Alas, the Toshiba is plagued by incompatibilities: its graphics characters are not the same as IBM's, and its bit-image graphics require the use of special Toshiba control codes.

If you don't want to deal with software commands, shifting the P321 between draft- and letter-quality modes is inconvenient. While most of the new 24-wire printers allow selecting letter or draft quality from front-panel buttons, the P321 forces you to dig into DIP switches (though quality can be changed with control codes, too).

### Another Robust Printer

Like the P321, the \$1,449 Star NB-15 from Star Micronics is a sturdy, robust printer. But that's where the similarity ends. The NB-15 puts a wealth of con-

## PC FACT FILE

### Toshiba P321

Toshiba America Inc.  
Information Systems Division  
2441 Michelle Dr.  
Tustin, CA 92680  
(714) 730-5000

List Price: \$699; tractor, \$99  
Requires: Parallel printer port (serial optional).

In Short: Affordable little brother to the Toshiba P351. A 24-pin, normal-width dot matrix graphics printer (76-characters-per-second draft and 42-cps letter quality) with superior typewriterlike quality. Emulates Qume Sprint 11 or Toshiba P351, but regrettably not Epson or IBM graphics control codes. Inconvenient DIP-switch fonts.

CIRCLE 628 ON READER SERVICE CARD

### Star NB-15

Star Micronics Inc.  
200 Park Ave.  
New York, NY 10166  
(212) 986-6770

List Price: \$1,449 with built-in tractor

Requires: Parallel printer port (serial optional).

In Short: A sturdy, wide-carriage, 24-pin dot matrix printer (130-character-per-second draft and 60-cps letter quality) with full IBM text and graphics compatibility. Emulates Epson printer codes.

CIRCLE 629 ON READER SERVICE CARD

### 2024L

Brother International Corp.  
8 Corporate Pl.  
Piscataway, NJ 08854  
(201) 981-0300

List Price: \$1,495 with built-in tractor; sheet feeder, \$299; wide-sheet feeder, \$399

In Short: A nice leap into the 24-pin, wide-carriage dot matrix market by a company known best for daisy wheel printers. Modest speed for price in draft mode (72 characters per second) but very little falloff (55 cps) in letter-quality mode.

CIRCLE 627 ON READER SERVICE CARD

## Brother Enters 24-Pin Market with 2024L

Brother's new printer, the 2024L, looks very much like its daisy wheel cousins: sleek, stylish office equipment in off-white and smoked plexiglass. Also like its cousins, it makes a bit of a racket, but it does produce good-looking copy due to the 24-pin dot matrix printhead. Printing width is 136 columns in pica, 272 in condensed.

The 2024L defaults to its near-letter-quality mode, and in PC Magazine Labs' tests it averaged 55 characters per second, a respectable speed. The high-speed draft mode is attractive but not much faster at 72 cps. Thus the 2024L is most useful for those who require a lot of near-letter-quality printing. The pica character matrix is 16 by 30; elite is 15 by 26.

The front panel of the 2024L resembles that of a Brother daisy wheel printer. It has five membrane buttons, one of which is used as a switch to move between pica, elite, proportional, and high-speed draft print styles. Another is used to select word processing or data processing modes. Tractor and friction feed are standard; automatic cut-sheet feed is optional.

—Phil Wiswell

(continued on next page)

# Farsight Claims 1-2-3 Compatibility

## PC FIRST LOOK

BY WINN L. ROSCH

The idea is both compelling and tempting: a 1-2-3 workalike for \$99 with word processing and windowing thrown in for free. Save a bundle and get a lot of features to awe your friends. At least that's the promise of the latest self-proclaimed 1-2-3 clone, *Farsight*, from Interface Technologies Corp.

*Calc*, the *Farsight* spreadsheet, reads, writes, and understands 1-2-3's file format. It recognizes 1-2-3 commands, has the same @ functions as 1-2-3, and comes up with the same answers as 1-2-3 when given the same spreadsheet to work with (thank goodness).

However, despite its maker's claims, *Farsight* is not an exact 1-2-3 clone. Its user interface features pull-down menus instead of slash (/) commands, and some function key commands require that you press Alt at the same time. Nevertheless,

if you know 1-2-3, you'll probably feel on familiar turf with *Farsight*.

### An Impossible Promise?

A *Farsight* press release claims that *Calc* will run all 1-2-3 macros. In the next breath, it claims that if a macro won't run, all you have to do is submit a copy of the incompatible macro to ITC and it will revise the *Farsight* program to work with the macro within 3 days. That's a weighty burden to bear—and one that may just overwork the ITC programming staff.

*Farsight* rejected the first macro I fed it, part of the PC Magazine Labs' benchmark test to measure calculation speed of a 1-2-3 spreadsheet. (*VP-Planner*, the best-known \$100 1-2-3 lookalike, runs the benchmark macro in PC News, "VP-Planner Bests 1-2-3 on Features, Price," *PC Magazine*, Volume 5 Number 3.) *Farsight* sputtered, beeped, and errored its way to an ignominious, incorrect, and premature end.

"A number of features that 1-2-3 users enjoy using are undocumented," notes Alan Williams, ITC vice president of marketing and sales. "When you write a product based only on the manual and the way the program behaves on-screen, it's hard to get a handle on all the undocumented features. There's no way we could catch all the undocumented features of 1-2-3 in our quality evaluation. We've had about six users so far call up with nonworking macros or templates so far. Thank God there haven't been six hundred!"

### Easy Word Processor

*Word*, *Farsight*'s word processor, is straightforward and about as easy to use as IBM's *Writing Assistant*. It incorporates common word processing functions, produces files that are nearly pure ASCII, and works with more than two dozen printers.

The proprietary *Farsight* windowing system is purely text-oriented, uses pull-down menus, and relies on function and cursor keys rather than a mouse. The program allows data to be shared and sent between windows, and even substitutes for a DOS front-end for disk management. It's cleverly

## PC FACT FILE

### Farsight

Interface Technologies Corp.  
3336 Richmond Ave., #200  
Houston, TX 77098  
(713) 523-8422  
(800) 922-9049

List Price: \$99.95

Requires: 256K RAM, IBM PC or 100 percent compatible, twin floppy disks or hard disk.

In Short: A full-featured 1-2-3 clone with added word processor and proprietary windowing system that will link to future ITC products. Not all 1-2-3 macros work with *Farsight*. Not copy protected.

CIRCLE 626 ON READER SERVICE CARD

done and very visual: on an AT, some commands cause an excited flurry of on-screen action. Even with an ordinary color graphics adapter, the program handles screen scrolls without annoying flicker.

### Can It Knock Off 1-2-3?

All that said, the marketing prognosis for *Farsight* stealing the crown from 1-2-3 probably is not good. Despite the initial success of *VP-Planner*, it's not clear how many users are lured first and foremost by price, and *Farsight* can't even boast full 1-2-3 compatibility, at least by the initial PC Magazine Labs tests. The word processor is workable, but pales next to *Microsoft Word*.

Likewise, *Farsight*'s windowing features work only with other (promised in the second quarter of 1986) ITC programs. Moreover, the world probably does not need another, different windowing standard. PC users have shown a reluctance to embrace integrated software packages like *Symphony* and *Framework II*, preferring instead to pick and match their own. The obvious effort ITC spent in cloning around with 1-2-3 would probably have been better spent on more creative products—a new generation of software rather than more of the same.

## Superior Printers

(continued from preceding page)

trots at your fingertips—not just paper movement, print quality, and pitch, but even paper length. The wide carriage of the NB-15 will handle 14-inch computer paper. A one-way tractor is built-in. And the NB-15 is fully compatible with the IBM character set and generally understands the same 24-wire graphics commands as the Epson LQ series. A software command even makes the NB-15 compatible with 9-wire graphics commands. (Alas, the only way of canceling this mode is by shutting the printer off.)

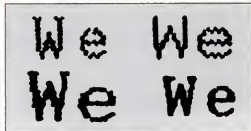
Although print quality from the NB-15 seems a tiny step lower than from the P321, the difference is more than justified by the NB-15's better performance: 130 cps in dark, sharp

draft-quality and 60 cps in letter-quality mode—faster than all but the best daisy wheels.

Two cartridge slots under the front edge, allow changing typefaces. The NB-15 has all the abilities of a dot matrix printer to change typefaces and fonts; it can even generate quadruple-height characters with a

single software command.

Overall, the Toshiba P321 rates as a good choice where quality, ruggedness, and price are equal concerns. When versatility and compatibility are as important as on-paper quality, Star Micronics' Star NB-15 rates as one of the most genuinely useful printers you can buy. □



3x enlargement of Toshiba P321 (left) and Star NB-15 print samples in draft- and letter-quality modes show differences in typefaces; in draft mode, both show wavy letters typical of 24-pin units.

# Compuclassics

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CIRCLE 205 ON READER SERVICE CARD

# Quadram, Qubié, Tatung Release EGA Monitors

## PC FIRST LOOK

BY VINCENT PUGLIA

Qubié, Tatung, and Quadram have begun shipping enhanced color display monitors. This trio adheres to IBM's technical specifications for its \$849 Enhanced Color Display (one of the two Editor's Choices, along with the \$799 NEC JC-1401P3A Multisync in "The EGA Standard: Monitors That Measure Up," Volume 5 Number 6). All run off either the IBM EGA or CGA card or equivalent. Yet there are enough differences to make them distinctive.

Quadram's \$795 Quadchrome Enhanced Color Display has a detachable tilt/swivel display that raises the unit 3 inches. There's a tilt/swivel base on the \$499 Qubié HR31-350, but the monitor can't stand up without it. The \$849 Tatung CM-1380M stands on its own four feet.

All three displays have two vertical size controls on the back panel. Other accessible controls include: Qubié, a voltage switch for American and European current; Quadram, two horizontal phase controls, a vertical hold control, and a text mode button; and Tatung, two horizontal center knobs and a text mode switch.

### Recessed Controls

Except for the text button, the Quadchrome controls are recessed and must be accessed with a screwdriver. The text mode controls switch the display from color to text and, in text, between amber and green.

Quadram's Quadchrome Enhanced Color Display sports the same front-panel controls as IBM's ECD, even down to the push/pull contrast button. The Qubié HR31-350 (which is manufactured by Basic Time) and the Tatung CM-1380M lack the push/pull feature. The CM-

1380M also differs in that its on/off knob is the bottommost of the three controls.

The contrast button on the Quadchrome is preconfigured for an optimum setting. Changing it affects both the normal and high-intensity colors. The brightness control is extremely sensitive and, if both brightness and contrast are turned down, text is still visible.

Colors on the Quadchrome are clean and relatively pure, although the brown is not as rich as that on the IBM ECD. Turning the brightness up past a certain point causes high-intensity text to blur. Although a Quadram spokesman said this effect is commonplace, it was not evident in either the Qubié HR31-350 or the IBM ECD.

### Dimmer Qubié Display

The Qubié HR31-350 needs to have the brightness control turned almost all the way up before anything displays. This drawback is somewhat offset by the lack of high-intensity blur, due in part to the HR31-350's black matrix screen. The black matrix screen creates a grid of fine black lines through which the pixels appear; these lines capture any diffusion and cut down on brightness. However, normal intensity text—like that used in DOS—becomes difficult to read.

Brightness on the Tatung monitor falls midway between the other two. A quarter-turn of the knob brings a display on-screen, allowing you an adjustment of another 75 degrees. Although the CM-1380M is not as free from high-intensity blur as is the Qubié monitor, the blurring is not as bad as that on the Quadchrome. Adjusting the contrast both removes blur and shifts the colors. Turning the knob even a little causes brown to shift from red to yellow and dark gray to shift to black. Most colors tend to be deeper than those on the IBM ECD.



Quadram's Quadchrome Enhanced Color Display is a close match in performance and features to IBM's Enhanced Color Display.

During the PC Magazine Labs grid-line test, the Qubié's vertical lines displayed a slight waver, and while the color bars were on-screen they bowed distinctly toward the viewer's right. The CM-1380M also has distortion and vertical alignment problems. The distortion is most easily noticed when the color bars are on-screen or in the upper-left-hand corner of the screen while any application is running; the wavering is apparent along the left and right screen borders. In contrast, the Quadchrome is perfectly aligned and the vertical lines in the center almost appear solid.

While all three vendors also sell 256K-byte, EGA-compatible boards, only Qubié is bundling both monitor and board. The half-length board sells for \$349 and can be bought with the monitor for \$825. Quadram's board costs \$595, producing a total cost of \$1,390; Tatung's half-length board sells for \$599, bringing the cost for its total solution to \$1,448.

Of the three monitors, Quadram's Quadchrome is the most preferable, although the bundled price of the Qubié monitor with the display adapter makes it most tempting. Do note, however, that Qubié's list price is also the selling price, while mail-order selling will push the Quadchrome's price into competition with Qubié.

## PC FACT FILE

### Quadchrome Enhanced Color Display

Quadram  
One Meca Way  
Norcross, GA 30093-2918  
(404) 923-6666  
List Price: \$795

Requires: Enhanced Graphics Adapter.

In Short: The Quadchrome, an alternative to the IBM ECD, offers a tilt/swivel base, two monochrome modes, and the same contrast, brightness, and colors. While both Quadram and Princeton Graphic Systems are subsidiaries of Intelligent Systems Corp., the Quadchrome is not the same monitor as Princeton's HX-12E. It has a 13-inch diagonal screen and 0.31-millimeter dot pitch.

CIRCLE 606 ON READER SERVICE CARD

### Qubié HR31-350

Qubié Distributing  
507 Calle San Pablo  
Camarillo, CA 93010  
(800) 821-4479  
(805) 987-9741

List Price: \$499; with EGA-compatible card, \$825

Requires: Enhanced Graphics Adapter.

In Short: The Qubié HR31-350 may not offer the same overall quality as the IBM ECD, but at the price it is more than a viable alternative. It has a 14-inch diagonal screen and 0.31-millimeter dot pitch.

CIRCLE 608 ON READER SERVICE CARD

### Tatung CM-1380M

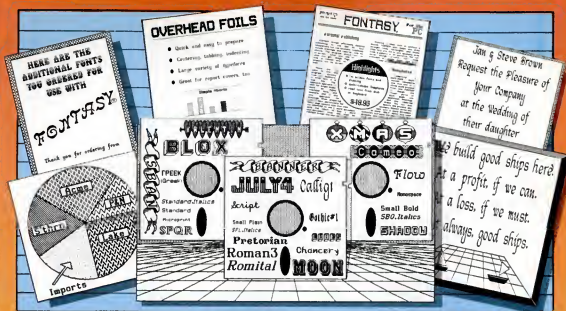
Tatung Co. of America  
2850 El Presidio St.  
Long Beach, CA 90810  
(213) 637-2105

List Price: \$849

Requires: Enhanced Graphics Adapter.

In Short: The colors of the Tatung CM-1380M are richer than those on the IBM ECD, but it's hampered by distortion and vertical alignment problems. Only on list price is it IBM's equal. It has a 13-inch diagonal screen and 0.31-millimeter dot pitch.

CIRCLE 607 ON READER SERVICE CARD



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CIRCLE 300 ON READER SERVICE CARD



# Review The INS Cast and Discover Premiere PC-to-Host Communications

The curtain is rising on a new era of PC-to-host communications as the INS Gateway PC Adapters make their debut in the latest production from Integrated Network Systems.

"The INS Story" is an exciting presentation of the continuing saga of micro-to-mainframe connection. The SDLC, 8100 or X.25 Gateway PC Adapters are center stage in providing you with a link between your PC network and your 8100, IBM mainframe computer or X.25 network.

The SDLC Gateway PC Adapter connects to any host supporting SNA/SDLC 3270 control units via leased or switched lines. Up to 32 PC's in your network can appear as logical units to the host, each with file transfer capability.

The 8100 Gateway PC Adapter connects to the multi-use communications loop of the IBM 8100 Information System, while the X.25 Gateway PC Adapter allows connection to public or private X.25 networks using switched or permanent virtual circuits to hosts supporting SNA 3270 control units. Both provide file transfer for as many as 32 network connected PC's.

The Gateway Adapters' many attributes give them the skill to adapt with ease to the many roles demanded by differing SNA networks:

- ★ SNA 3274 cluster controller emulation
- ★ On board microprocessor

- ★ Host initiated file transfer allowing unattended transfer operation
- ★ Local screen capture to printer or disk
- ★ Up to 32 LU sessions
  - 3278/3279 display emulation
  - 3287 printer emulation
  - Two terminal sessions and one printer session per PC

A feature common to both the Gateway PC Adapters and the INS PC Adapters is the Application Program Interface (API). The API enables user-written programs to perform operations as simple as automatic logon or as complex as transaction routing and data store and forward.

INS guarantees all its PC products for five years, so reliable performance is never left to chance. Not just hardware, but software, too!

The price of Gateway admission is only \$1,995\*. At that price, the coax PC connected to a cluster controller will be yesterday's script. So don't be left out on opening night — make your reservation for an INS adapter today. Call toll free 1-800-SNA-3270 or (205) 633-3270. Dealer inquiries welcome.

CIRCLE 319 ON READER SERVICE CARD

**INS**  
P.O. Box 91395  
Mobile, AL 36691

\*Price applies to SDLC and X.25 Gateway PC Adapters. 8100 Gateway PC Adapters are \$2,295.

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Supports 640 × 350 for IBM's Enhanced Color and Monochrome Displays and compatible monitors	✓	✓
Supports full 16 colors in 640 × 350 on the IBM Enhanced Color Display <sup>™</sup> and compatibles	✓	✓
Supports full 16 colors in 640 × 200 and 320 × 200 for the IBM Color Display	✓	✓
Parallel printer port	✓	
Soft scrolling, panning and windowing		✓
Optional Clock/Calendar	✓	
Supports a light pen interface	✓	✓
Includes PC Accelerator <sup>™</sup> , STB's exclusive utility program which provides up to 10 disk emulators, 3 print spoolers and utilizes available system memory, PC/AT memory above one megabyte and EMS memory (Lotus <sup>™</sup> /Intel <sup>™</sup> /Microsoft <sup>™</sup> ) through STB's Memory Companion/PC <sup>™</sup> board.	✓	
Which board sells for 40% less than the other comparable product?	✓	

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# ■ NEW ON THE MARKET ■ PAUL M. STAFFORD



## **Bondwell 8 Laptop: 11-Pound Compatible with 3½-Inch Drive**

Bondwell, maker of portable and transportable computers, has entered the PC-compatible laptop market with its 11-pound Bondwell 8.

The Bondwell 8 packs 512K bytes of RAM, a 300-bit-per-second modem, a 3½-inch disk drive, and an 80-character by 25-line backlit LCD display that also runs in graphics mode at 640 by 200 pixels. Also included: a rechargeable battery, RGB and composite color video outputs, one serial and one parallel port, a port for an external disk drive, MS-DOS 2.11, and GWBASIC 2.0. Bondwell claims that the Bondwell 8 is compatible with all DOS software, through either an optional 5¼-inch floppy drive, down loading, or the included XCOPY utility.

**List Price:** \$1,595. **Bondwell**, 3300 Seiden Ct., #10, Fremont, CA 94539; (415) 490-4300.

CIRCLE 622 ON READER SERVICE CARD

## **Smartcom II Allows Modem-Sharing on PC Network**

Notcross, Ga.—based communications giant Hayes Microcomputer Products has released a version of its popular *Smartcom* communications software that supports NETBIOS-compatible products such as IBM's PC Network.

*Smartcom II* for the PC Network extends familiar *Smartcom II* functions to all PCs on the network. It provides for shared access to modems and serial ports and includes software for performing serial server functions on the PC Network. *Smartcom II* for the PC Network is compatible with DOS 3.1 and IBM's NETBIOS network interface. The software is copy

protected, and a separate copy is required for each serial device shared on the network.

**List Price:** \$599 for one program disk and five user guides.

**Requires:** 512K RAM, IBM PC Network-compatible networking

hardware and software. Hayes-compatible 300-, 1,200-, 2,400-bps modem, DOS 3.1 or later. **Hayes Microcomputer Products Inc.**, P.O. Box 105203, Atlanta, GA 30348; (404) 449-8791.

CIRCLE 621 ON READER SERVICE CARD

## **HOT PROSPECT**

### **3-D Modeling for Micros: McDonnell Douglas's microCUBE Spreadsheet**

Conventional microcomputer spreadsheet packages organize data into two dimensions—columns and rows. Mainframe modeling programs have long offered a third dimension—pages that overlay each other like the clear-plastic overlays that architects and engineers use to show depth. With the release of *microCUBE*, McDonnell Douglas has introduced serious 3-D modeling capability into the microcomputer spreadsheet world.

McDonnell Douglas calls *microCUBE* a "spreadspace." The "page" dimension gives modelers the flexibility to switch perspectives easily between three different spreadsheet orientations. It also gives them several options for consolidating different spreadsheet files into single 3-D spreadsheets.

Using its "goal solution" feature, users can input target results into their

spreadsheets. *microCUBE* will adjust the variables to produce the new totals and highlight each cell that was changed in the process. Other features include communications; graphics; password protection by file or cell; sparse memory management so that only cells with data take up memory; and the ability to import ASCII, DIF, and NIF files. *microCUBE* ships on six floppy disks. Recommended options are 640K RAM, color/graphics capability (it supports IBM's EGA standard), a plotter, and a modem. It is copy protected.

**List Price:** \$1,200. **Requires:** 512K RAM, hard disk drive, DOS 2.0 or later. **McDonnell Douglas Communications Industry Systems Co.**, 7535 E. Hampden Ave., #200, Denver, CO 80231; (303) 695-1500.

CIRCLE 623 ON READER SERVICE CARD

CONDENSED STATEMENT OF EARNINGS		
	1987 (Projected)	1986
Report Ended 11 January		
Net Income in millions except EPS		
Sales	\$1,000.0	\$1,000.0
Other Income	50.0	50.0
Gross Income	\$1,050.0	\$1,050.0
Cost of Sales	2,000.0	2,000.0
Administrative Expenses	100.0	100.0
Interest Expense	100.0	100.0
Income Taxes	100.0	100.0
Total Operating Expenses	\$2,300.0	\$2,300.0
Net Earnings	150.0	150.0
Earnings per share	\$1.50	\$1.50
Income-Tax Rates		

McDonnell Douglas's \$1,200 *microCUBE* is a 3-D spreadsheet. It highlights all values that are changed when you perform recalculations.

## **Zero-Expansion-Slot Overthruster Boosts PC Speed by 100 Percent**

Nucleus Inc. of Fountain Valley, Calif., has introduced an accelerator card to plug directly into the PC's motherboard, boosting computing speed by nearly 100 percent, the maker claims.

Called the Overthruster, the board plugs into either the 8284A chip socket or the 8088 CPU socket and is switchable between 4.77- and 7.38-MHz speeds. It has an indicator LED and a reset button that performs hardware reboots of the PC. It has been tested for compatibility with *dBASE III*, 1-2-3, *Symphony*, *Supercalc*, *WordStar*, and *NewWord*. Nucleus ships the Overthruster with an NEC V20 microprocessor chip; it claims the two products work together to produce a cumulative acceleration of as much as 280 percent.

**List Price:** \$195. **Nucleus Inc.**, 17288 Santa Barbara Ln., Fountain Valley, CA 92708; (714) 841-3336.

CIRCLE 610 ON READER SERVICE CARD

## **Your Move Utility Lets Users Share Data Between Programs**

Goldata Computer Services Inc., makers of *GOLDATABase*, have introduced *Your Move*, a memory-resident utility that lets users easily transfer data between programs.

After loading *Your Move*, users can capture data from one program, exit the program, boot up another, and then hit a "hot key" and transfer the captured data into the second application. *Your Move* includes a built-in macro facility.

**List Price:** \$59.95. **Requires:** 128K RAM, DOS 2.0 or later. **GOLDATA Computer Services Inc.**, 2 Bryn Mawr Ave., Bryn Mawr, PA 19010; (800) 432-3267.

CIRCLE 614 ON READER SERVICE CARD

## **V-EMM's Virtual Memory Technique Increases PC Memory to 8 Megabytes**

The V-EMM from For's Software increases the PC's expand-

(continued on next page)

## New on the Market

(continued from preceding page)

ed memory capacity up to 8 megabytes by using a main-frame trick known as "virtual memory." Working in conjunction with the Lotus/Intel/Microsoft-compatible expanded memory hardware, V-EMM intercepts program calls to map-expanded memory pages. If expanded memory is full, V-EMM steps in and trades disk space from the user's hard disk to map the page, allowing EMS-compatible programs to take advantage of the auxiliary RAM.

**List Price:** \$89.95. **Requires:** 128K conventional RAM, 256K EMS-compatible expanded RAM, hard disk drive, DOS 2.0 or later. **Fort's Software, P.O. Box 396, Manhattan, KS 66502; (913) 537-2897.**

CIRCLE #15 ON READER SERVICE CARD

### CTXT Computer Puts 80286 Processor in XT Chassis

CTXT Systems Inc. of Chatsworth, Calif., says its CTXT computer, which has a PC-XT-type chassis but an 80286 processor, runs nine times faster than an XT. The base system includes system housing, a Terminator 286 motherboard with 640K bytes of RAM, a 150-watt power supply, a keyboard, MS-DOS, and a user manual.

According to tests done in the PC Magazine Labs, the CTXT's Terminator 286 motherboard clocks in at a speedy 9.2 on Norton's SysInfo benchmark

test (an XT is 1.0), and the hard disk drive is rated at a 28-micro-second average access time. CTXT Systems includes a 30-day money-back guarantee.

**List Price:** \$1,750; with a 20-Mbyte hard disk and double-density floppy drive, \$2,450. **CTXT Systems Inc., 9205 Alabama Ave., Suite E, Chatsworth, CA 91311; (800) USA-CTXT; in Calif., (800) GET-CTXT.**

CIRCLE #11 ON READER SERVICE CARD

### PicturePower, Color PhotoBase Put Digitized Images into Databases

Both **PicturePower** from PictureWare Inc. and **Color PhotoBase** from Chorus Data Systems add visual impact to data by allowing users to incorporate digitized images into databases.

**PictureWare** claims full dBASE III-compatibility for its **PicturePower** software. It accepts black-and-white images from virtually any digitization method, including video camera, and works with both Chorus and AT&T digitization cards, and the Tecmar Graphics Master and color display card. **PicturePower** also offers a wide range of editing and retouching functions.

**Color PhotoBase** is compatible with dBASE II and III, R-base 4000 and 5000, and IBM Filing Assistant software. It works only with Chorus's 332 video digitizer and is also offered as part of The Developer II system, which also includes a display adapter, monitor, copystand/light assembly, and the 332 PC-Eye digitizer.

**List Price:** **PicturePower**, \$795. **Requires:** 512K RAM, hard disk drive, Chorus PC-Eye or ATT Targa series digitizer, Tecmar Graphics Master video card, black-and-white composite monitor, DOS 2.0 or later. **PictureWare Inc., 111 N. Presidential Blvd., Bala Cynwyd, PA 19004; (215) 667-0880.**

CIRCLE #17 ON READER SERVICE CARD

**List Price:** **Color PhotoBase**, \$495; The Developer II, \$3,995. **Requires:** 512K RAM, hard disk drive, 332 PC-PC-Eye digitizer, DOS 2.0 or later. **Chorus Data Systems, 6 Continental Blvd., Merrimack, NH 03054; (603) 424-2900.**

CIRCLE #16 ON READER SERVICE CARD

### AST's ShortPak Half-Size Memory Expansion Card Saves Space

Space-conscious users should look into AST Research Inc.'s ShortPak card. It fits into a short expansion slot and adds up to 576K bytes of RAM to a PC, XT, or compatible.

The card comes in three configurations: 64K, 256K, and 384K. Users can, however, add 64K RAM chips to boost the memory in a 64K PC up to DOS's 640K limit. The ShortPak also features AST's SuperPak utility programs, which include two RAMdisk programs and a print spooler.

**List Price:** 64K, \$245; 256K, \$395; 384K, \$495. **AST Research Inc., 2121 Alton Ave., Irvine, CA 92714; (714) 863-1333.**

CIRCLE #13 ON READER SERVICE CARD

### JDL 24-Pin Printer Does NLQ Text, Color Graphs on 17-Inch Paper

The JDL 750e Printer/Plotter is a 24-pin dot matrix printer that can print near-plot-quality graphs in up to 14 colors from its four-color ribbon, as well as near-letter-quality (NLQ) text. JDL claims 180 characters per second in 10-pitch draft mode, 100 cps in 10-pitch NLQ mode, and 10 inches per second in graphics mode. The JDL 750e features five resident fonts and up to 64K bytes of RAM for downloadable fonts. Its friction-



The \$1,850 JDL 750e Printer/Plotter produces near-plot-quality 14-color graphics output.

feeds paper up to 17 inches wide, is code-compatible with IBM's Color Dot Matrix Printer and the Diablo 630, and accepts output from serial and parallel ports.

**List Price:** \$1,850. **JDL Inc., 2801 Towngate Rd., #104, Westlake Village, CA 91361; (805) 495-3451.**

CIRCLE #20 ON READER SERVICE CARD

### SigmaEGA! Emulates Four Video Cards: IBM Mono, EGA, CGA, and Hercules

Sigma Designs has joined half a dozen firms in announcing a graphics controller card that supports the four most popular PC display standards: IBM's Monochrome Display Adapter, Color/Graphics Adapter, and Enhanced Graphics Adapter and the Hercules monochrome graphics adapter. The half-length SigmaEGA! runs with all MDA/CGA/EGA and Hercules-compatible monitors and software and contains the maximum 256K bytes of EGA graphics memory. The package also includes ZSOFT's **PC Paintbrush** drawing software.

**List Price:** \$595. **Sigma Designs, 2023 O'Toole Ave., San Jose, CA 95131; (408) 943-9480.**

CIRCLE #18 ON READER SERVICE CARD



PictureWare's \$795 **PicturePower** lets users put digitized images from any source into their databases.



## ■ PC UPDATE ■ CHARLES BERMANT

After promising an unprotected version of its \$179 **Fastback** software backup utility, Fifth Generation Systems of Baton Rouge, La., has done an about-face. The company had promised users an unprotected version for a \$25 upgrade fee. What users got instead was a copy-protected version that allows two hard disk installations. Customers who sent for the \$25 upgrade will get their \$25 back and a copy of the installable version. Refunds are available (from dealers) for customers who want only an unprotected product. A company representative contends that "a vast majority of the people who wanted the unprotected version only wanted something they could install on a hard disk." The version being shipped now is the installable, copy-protected version.

Customers who use red write-protect tabs on 3M floppy disks may see red in more ways than one. Normally the tabs (usually black or silver) block a sensor that allows the drive to write data to the disks, but some disk drives "see" right through the red tabs and overwrite valuable data. For a few months last year, the 3M Co. of St. Paul, Minn., manufactured red write-protect tabs to go with its disks. A company spokesperson says that the red tabs work with most—but not all—major drives. Replacement supplies of black write-protect tabs are available free by calling the 3M disk hot line: (800) 328-9438.

Borland International is shipping Version 1.1 of its \$99.95 data-analysis program, **Reflex: The Analyst**, which supports almost two as many fields and records as Version 1.0. The upgrade fee is \$10, plus return of the three original program disks. Version 1.1 supports the Lotus/Intell/Microsoft expanded memory specification. It also works with additional graphics boards (but in monochrome only: IBM CGA and EGA, Hercules, AT&T 6300, and IBM 3270 PC). For information, call Borland at (408) 438-8400.

MCI Communications Corp. of Washington, D.C., and CompuServe Inc. of Columbus, Ill., have interconnected their respective electronic-mail services, allowing their subscribers instantaneous communication with one another. Both of CompuServe's electronic-mail services, **InfoPlex** and **EasyPlex**, will interconnect with MCI Mail. Subscribers of either service can create and send messages to subscribers on either network using the same access methods and commands they currently use.

Novell Inc. of Orem, Utah, has released **Advanced NetWare**, Version 2.0. The enhanced operating system software now offers DOS 3.1 compatibility, enhanced user utilities, a NetWare tutorial,

and an autospool feature. Also added are internal and external bridging capabilities, generic operating system software, network diagnostics software, NETBIOS emulation, and an internetwork communications protocol. Upgrades start at \$195.

Lotus Development Corp. of Cambridge, Mass., has announced that it will continue its upgrade program for 1-2-3, Release 2, through the end of 1986. The program was to have expired on March 31. Upgrades are \$150 for prior releases but free for copies of 1-2-3, Release 1A, purchased after April 24, 1985.

Digital Communications Associates of Alpharetta, Ga., has enhanced its **Fastlink** modem for its IRMA system. Fastlink allows users to transmit data at up to 18,000 bits per second, with a 14,000-bps typical throughput, over ordinary phone lines. The previous version was rated at 14,000 bps, with a 10,000-bps typical throughput. Done without data compression, the transmission is asynchronous and has error detection and correction capabilities. Fastlink also offers remote-access capabilities, allowing users to change parameters from remote locations. The price for the Fastlink card is \$1,995; the standalone version is \$2,395. Upgrades are available in either a \$99 kit or a \$250 factory enhancement.

SPSS Inc. of Chicago, Ill., has joined with Microsoft Corp. of Redmond, Wash., to produce **SPSS/PC+**—a new package that features **Microsoft Chart**. **SPSS/PC+** costs \$795, and the **Microsoft Chart** is an additional \$395.

Softbridge Microsystems of Cambridge, Mass., has released Version 2.0 of its **Softbridge Financial Planner**. It features improved data-entry capabilities and enhanced customization abilities and allows the importation of 1-2-3 spreadsheets into the system. Output capabilities have also been improved and a data-networking facility has been added. The software costs \$6,000 and is also available in a turnkey system with a Compaq 286 for \$11,450.

Great Plains Software of Austin, Tex., has incorporated the public-domain **Btrieve** and **Btrieve/N** file-management system into the newest release of its accounting series. The nine modules in the series, available in single- and multiuser versions, also incorporate revisions to the existing accounting products. The single- and multiuser systems cost \$245 and \$595, respectively.

*PC Update reports on software and hardware enhancements. To contribute, write or call PC Magazine, One Park Avenue, New York, NY 10016; (212) 503-5251.*

## PC Technical Excellence Awards Set for April 28

BY BILL HOWARD

*PC Magazine's* 2nd annual Awards for Technical Excellence will honor the people behind the scenes of the personal computer industry responsible for technological breakthroughs and innovative designs in hardware and software products.

The Awards for Technical Excellence will be presented by *PC Magazine* editor Bill Mach-

rone at an April 28 ceremony at the Georgia Tech Research Institute Labs during Spring Comdex, which runs from April 28 through May 1 in Atlanta.

The site was chosen by *PC Magazine* because the Georgia Institute of Technology is one of the nation's leading computer-science research and development laboratories, just as *PC Magazine* Labs is the computer publishing industry's premier

test facility. Georgia Tech ranks first among all public universities in industry and engineering research and development expenditures and is sixth among all universities—public or private—in computer-science funding.

*PC Magazine* accepted nominations from the industry for breakthrough hardware and software products introduced and marketed in 1985.

Last year's winners were: Philippe Kahn, Borland International, for Turbo Pascal; Robert Carr, Ashton-Tate, for *Framework*; Eugene Hill and Jim Slager, Intel, for the 80286



microprocessor; Jeff Garbers, Microsoft, for *Infoscope*; Robert Hamilton, The Software Group, for *Enable*; and Henry Kee for the PC Blue series of free software.

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CIRCLE 124 ON READER SERVICE CARD



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The DMP 430 (26-1277, \$899) is a 132-column dot-matrix printer with an 18-wire print head that delivers superior correspondence characters in a single pass. Choose from micro, italic

and double-high fonts, as well as bit-image graphics. In the draft mode, the DMP 430 delivers a fast 180 characters per second.

#### Low-cost, triple-mode personal printer

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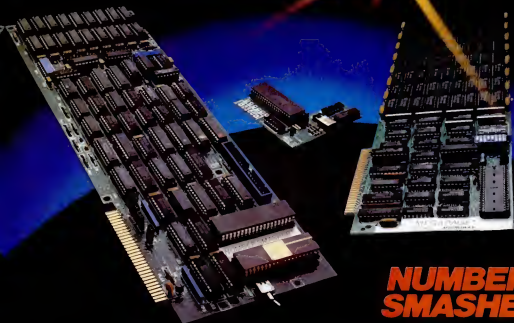
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**CIRCLE 159 ON READER SERVICE CARD**

# Map-Master Mixes Data, Geography

## FIRST LOOK

BY CHARLES BERMANT

*Map-Master*, the newest product from Decision Resources Inc., shares both the basic command structure of its siblings (*Chart-Master*, *Sign-Master*, and *Diagram-Master*) and their operating philosophy: make it powerful but simple.

*Map-Master* produces maps of the United States, individual states, counties, and ZIP code areas. These maps can be colored, shaded, or exploded on the basis of either your own data or data supplied by the program. The \$99 modules supply data broken down to the county, metro area, or ZIP code level; world maps are also available.

*Map-Master* isn't alone in this growing field. Competitors include Rand-McNally's

*RANDMAP* (a \$795 version of *STATMAP*) and the \$95 U.S. maps add-on to Computer Support Corp.'s *Diagram* (\$395).

*Map-Master* works with a Hercules card and floppy disks,

but it really demands a hard disk with 1.5 megabytes free and an EGA color monitor.

A "DataGrabber" function allows importing figures from a spreadsheet. After data is entered on the draft map, the final result can be output to the screen, printer, plotter, or film recorder in a choice of eight colors, eight hatching patterns, seven type fonts, and 16 type sizes.

## TURNER-STEVENS, INC.

FIRST QUARTER SALES BY STATE



Sample map output by the \$395 *Map-Master* on a Hewlett-Packard plotter. It can generate maps detailed to the ZIP code level and can use data either entered by the user, supplied with the program, or downloaded from the \$99 statistics modules.

The program uses five disks, and its copy-protection scheme includes a hard disk install and uninstall option.



## FACT FILE

### Map-Master

Decision Resources Inc.  
25 Sylvan Rd. South  
Westport, CT 06880  
(203) 222-1974

List Price: \$395; optional map modules, \$99

Requires: 384K RAM, graphics adapter.

**In Short:** From the makers of *Chart-Master*, *Map-Master* is an easy-to-use program that generates U.S. or world maps, using your data, basic statistics supplied with the program, or in-depth data sold as add-on modules. The program really needs a hard disk, a high-resolution color monitor, and a high-quality plotter. Copy protected.

CIRCLE 625 ON READER SERVICE CARD

## COMMUNIQUE ■ EDITED BY BILL HOWARD

### Life of the Party

Borland International's *Turbo Lightning*, with its spelling checker and thesaurus, may have an out-of-the-office future ahead of it—as a party game. Used to excess, this program or any other spelling checker/thesaurus can render well-constructed prose into incomprehensible gibberish.

Here's an example, using the first paragraph of a story from *The New York Times*:

#### Thousands Crowd Shelters in Flood

Sacramento, Calif., Feb. 21—Thousands of people were crowded into emergency shelters today and officials could not say

when they might be able to return to homes flooded after a levee holding back the Yuba River broke suddenly Thursday night.

And here's the same story run through *Turbo Lightning*:

**Tediousness Cords Swelter in Flood**  
Sacrawniest, Calif., Fez 21—Thrusters of peep-hole were corroded into estrogen scepters today and Floridians could net scab when hither minuet be belled to Teresa or hams offloaded after a veneer hedging bare the By-law verity snivelled Turbidly glints.

It's only a matter of time before the craze catches on.

### Readin', Ritin', and Rippin' Off Software

A software developer who does considerable business within the academic community complained to a college audience recently about software piracy, noting, "I don't see why you

think it's OK to illegally copy software when you don't steal hardware."

Piped up one academic, "We would if we could."

The developer was asked why he doesn't just confine his work to college ethics and religion departments.

His reply: "They're the worst ones."



### Quotations from Chairman Adam

Adam Osborne on the highly rated *Paradox* database:

"It's like the Macintosh. The first week, you're amazed at what it can do. After that, you're amazed at what it can't."



## ■ FROM THE EDITOR'S SCREEN ■ BILL MACHRONE

# A PERFECT 6.3



*Although PC Magazine does its best to develop objective measures of product quality, quantification can be carried too far. Subjective evaluation by experts counts, too.*

The new word processor is a 6.4. The tape backup drive rates five check marks. It's a four-star database. With a bit of effort, you can reduce anything to a number. The trouble is, what does it mean?

Reviews are important to most computer publications, and they are vital to *PC Magazine*. They play a big part in purchasing decisions for both individuals and corporations. Our readers have come to expect comparative reviews that place a product against its competition and in the market overall.

We've made a major investment in PC Magazine Labs to bring you the most reliable measured performance figures available. Our statistics make for great bar charts and computer one-upmanship. But if we stopped there, we'd be doing you a disservice. The fastest product is not necessarily the best, just the fastest. And the best product may not be the best for you. Too many magazines, however, succumb to the temptation to quantify their subjective evaluations with numbers.

The scenario goes like this: You come up with, say, half a dozen categories and ask yourself some questions, such as "On a scale of one to ten, how good is the documentation?" You divine a number for each category, then average them. The resulting number sums up the product. And it's much more precise, of course, if you carry it out to one or two decimal places.

M.J. Moroney, in one of my favorite reference books, *Facts From Figures*, refers to this practice with the dry wit that only a British scholar can summon: delu-

sions of accuracy. Reducing subjective evaluations to decimal numbers is a laudable attempt but ultimately does everyone involved a disservice. You can get incredibly bogged down in formulas, weighting factors, and correction curves. Ultimately, it's no more successful than the attempts of the pre-Copernican astronomers to prove that the sun rotates around the earth.

**THE SUBJECTIVE SIDE** We stand by our objective measurements, but frankly, they're the easy part. Subjective measurements are much tougher. For instance, in our recent word processing reviews, the testing script that we used on each product had over 400 questions or test points on it but we made no attempt to weight the importance of one feature or area of investigation over another. That weighting emerges naturally when you simply sit down and use the product. Our reviewers, after having been exposed to ten or so

products apiece, develop keen perceptions about what works and what doesn't.

Another important point in the review process is categorization. When we did our special issue on word processing, we categorized the products into three major classes: personal, professional, and corporate. You wouldn't believe how many word processor publishers and users have thanked us for these distinctions. They, like everyone else, were tired of seeing *MultiMate* compared with *WordStar* and *XyWrite*. We also did something else that was dramatically different. We had each publisher assign a power user to its product, so that an expert was continually on hand during the review process. There was no chance that we would miss an important feature or an alternative way of doing things because of poor documentation. Having an experienced user there also insulated us from our own prejudices. We'll be adopting this technique for more product categories in the future.

With the advent of PC Labs, we've caused as many problems as we've solved. Some of our most accomplished reviewers like nothing better than working at home in the wee hours, gleefully torturing products. Unfortunately, that method doesn't fulfill our need to execute standardized tests on standardized machines. As a result, our reviewers are spending more time in the Big Apple these days.

Dispersing review software and hardware far and wide is not in our best interest when it comes to educating our own editors, either. They can't very well learn about a new product by editing an article



## ■ FROM THE EDITOR'S SCREEN

that someone else wrote. To that end, we've designed a special demo room right in the middle of our editorial offices. It's equipped with hardware and software that can handle virtually any kind of product.

Multiple monitors give everyone a clear view. It's a great environment for manufacturers to display their wares. After all, it costs a pretty penny to do the media road show when rolling out a new product. The

least we can do is be good hosts. The more of our staff that gets exposed to a product, the more likely we are to portray it correctly when we write about it.

**BEGINNERS AND EXPERTS** Some publications make much of their beginner panels. Others tout the expertise of their reviewers. The beginner-oriented publications contend that they portray the learnability of the products they test. The others don't address learnability very much. I don't put much store in learnability myself. If you let a neophyte judge a product, you run a substantial risk of settling for too few features. It takes expertise and wide exposure to properly evaluate the completeness of a product's features. And for corporate customers, the teachability and supportability of a product are far more important than its learnability.

In a sense, there is no such thing as objectivity. What you really want is the right set of biases. Reviewers who are biased toward IBM PCs will do a better job reviewing IBM hardware and software than generalists who are also interested in Amigas and Ataris. Reviewers who train users and solve problems for a living will do a better job than abstract theoreticians. As good as our editors are, we have to calibrate our judgments against the perceptions of the business community, user groups, and industry gatherings.

Another reason not to use numeric scores is purely selfish: it brings the twists out of the woodwork. All the clowns who love to gas about the fastest way to code the Sieve of Eratosthenes benchmark test in FORTRAN will get on their high horses and "prove" that their favorite product was really a 6.9, not a 6.3. Who needs it?

My final objection to numeric scores is that they let the lazy evaluator off the hook. I'd be mortified if I found out that someone had justified the purchase of one product over another because *PC Magazine* had rated one a 6.3 and the other a 5.9. The feature mix of the supposed 5.9 might be infinitely better suited to the needs of the evaluator's company, but many people have this need to be "scientific."

Remember Reggie Jackson? He has never been more than a .250 hitter. His real talent is uncorking the big one when it counts most.

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CIRCLE 191 ON READER SERVICE CARD

PC MAGAZINE ■ MAY 13, 1986

# PC NETWORK GOES TO THE

# ORIENT

## DIRECT

How do you suppose most manufacturers of personal computer products get started?

They go to the Orient...taking either their designs or simply their ideas to one or more of the major electronics manufacturing concerns, getting bids for making these devices under contract to the creators. Multifunction Cards, Video Cards, Disk Controllers, Modems and I/O Boards all begin their life in this way.

This relationship between the manufacturing capabilities of the East and the design and marketing talents of the U.S. has resulted in the incredible selection of enhancement products for the IBM and Apple computer markets.

Well, with 100,000 members and growing strong, The Network sent its buyers east to visit some of these manufacturing

concerns to check out the feasibility of directly importing these products in the necessary volumes to *save our members money!* What they came back with was astounding.

Now, we always figured that there were some pretty substantial markups as these boards came into the country and got fancy boxes and marketing promotions under any one of a number of well known brand names in the peripheral add-on markets *but we had no idea they were so large!*

To prove our point, consider what they brought back. Each board is constructed to the same precise standards, on similar machinery to their name-brand duplicates. The difference? *As a Network member, you pay only 8% over our unusually low wholesale price...and you get our full 1 year warranty!*

### Hercules™ Smarter Brother

A Monochrome Graphics Card with Printer Port...100% compatible with Hercules™ product...



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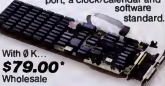
If all you want is a printer, this is the card for you. Supports all text and graphics printer features.

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### The Multi-384 Board

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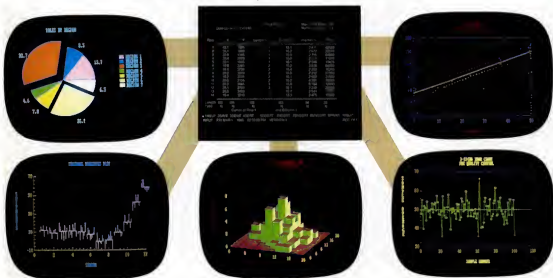






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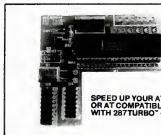
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■ PETER NORTON

# SEARCH AND IDENTIFY



*Getting a program to automatically identify the equipment it's running on is a tricky task. Norton explains how his System Information program can ferret out this information.*

In this column, I thought it might be interesting to let you in on some of my trade secrets.

In last issue's column, I covered a curious little problem that cropped up in *The Norton Utilities*' SI (System Information) program—an embarrassing inconsistency in the way SI reported the speed of your PC. Since I've been talking about some of the internal workings of SI, I thought I'd answer one of the questions that I'm asked most often: How does the SI program identify the machine that it's working on?

**IDENTIFYING HARDWARE** An important factor in running many programs is the hardware you use them on. For example, a program must identify the display adapter it's working with so that it can adjust its operation accordingly—to take advantage of graphics resolution, to use or not use color, to avoid the "snow" that plagues the standard color/graphics screen, or to skip the special operations that snow avoidance calls for.

For some programs, taking advantage of the maximum potential of the display screen is essential. This is true for word processing programs and even more true for programs that get their visual sizzle through graphics—such as the impressive *Framework II* or *Microsoft Windows*. For other programs, such as my *Utilities*, however, identifying the hardware is just a side issue.

**TWO APPROACHES** Programs can take one of two approaches to find out what they are working with: they can figure it out

themselves, or they can ask you. Asking you, unfortunately, is the preferred way: it's done, of course, through the installation step that you usually encounter in major programs. Some parts of program installation involve copy protection and such practical issues as specifying a directory for the files. The other part of an installation procedure tells the program the kind of hardware it's working with; the key points are the type of display and the printer.

In 20/20 hindsight, it's a shame that the design of personal computers doesn't automatically give programs a way to identify the equipment they're running on—whether on a hardware level (with each piece of equipment reporting what it is in a standard way) or some other way (say through a disk file similar to AUTOEXEC.BAT and CONFIG.SYS in which you report your machine's features for all programs to see). But no matter how it's done, everyone would be much better off if all

programs included a uniform and convenient method of adjusting to the equipment they're working with.

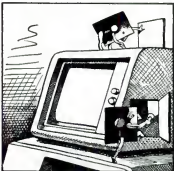
However, some programs, including mine, do try to figure out what equipment they're using on their own. Probably the most impressive example of this type of package is *Microsoft Word*, which can identify the display screen it's working with. That's not an easy task, but if anyone has the wizardry to do this sort of thing, it's Microsoft.

My utility programs have much less need to know what machine they're working with. It's more a matter of curiosity and a certain amount of professional pride for me to see if I can identify the machine and then, with SI, report it to you.

**TRADE SECRETS** So I'm going to tell you how I identify various kinds of PCs. But if you're expecting something marvelous, you'll be disappointed, because my methods are all rather unsophisticated.

The method I use relies almost entirely on inspecting the contents of the computer's ROM BIOS—the high memory locations where the computer's built-in programs are stored. By snooping around inside various machines, I discovered a unique way to identify each machine that I could get my hands on to test. When I first started playing this game, I quickly discovered that the best way to identify the PC's maker was simply to scan for the name in plain language. IBM's PCs say IBM on them.

If you go exploring for yourself on some machines like the AT, you'll think





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you're seeing double, because you'll find things like this: "IIBBMM." This strange doubling occurs when a machine uses two memory chips with each one holding alternating bytes of memory: in the process of making sure that each chip has its owner's name on it, the message gets doubled.

By checking a bunch of machines, I compiled a list of the identifying marks and where they were located (searching the whole BIOS takes too much time, so my programs need to know where to look, as well as what to look for). At first I wanted

■ By snooping around inside various machines, I discovered a unique way to identify them.

to identify every PC compatible made, but there are simply too many of them. So I settled for setting up my programs for the major manufacturers with a handful of obscure machines (Hyperion, Mindset) thrown in for good measure.

Although the methods I use are more effective than you might think (my original method for Compaq has worked without change on each new Compaq model I've tried and my IBM method successfully identified the IBM PC AT model in advance), they're pretty useless for identifying machines that I haven't personally checked out.

Since I want my SI program to tell you as much as possible about your computer, I try to find some identifying mark on any computer even if the SI program can't recognize it. The trick is to look for the copyright notice that should appear in any BIOS. By legal convention, there are only three standard ways of indicating a copyright: "Copyright" spelled out in full, the symbolic form "©," and "Copr."—an official abbreviation that is used a great deal.

If I can identify a machine, my SI program can specify what it is. But if all I can find is the copyright notice, I figure that the name that follows the copyright might

mean something to you, and so my SI program spits out a message showing it.

**SOME GLITCHES** Such things can go awry, though, as *PC Magazine* contrib-

uting editor Charles Petzold discovered when he tried my SI program on a relatively obscure machine I'd never seen—the Gulfstream Professional 88. Like most PCs, the Gulfstream can work with a math

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coprocessor. Since the Gulfstream's BIOS checks out the coprocessor, it has an error message that reports problems. My program found that message and mistook it for a copyright notice, relaying a rather comic message to Petzold. "This machine can be identified by: Coprocessor Error". Now that wasn't intended to be an editorial comment on the Gulfstream, although you might be tempted to think it is.

Of course, you want to go a step further and identify the model as well. Unfortunately this process can be more uncertain

## ■ IBM marks its PC models in two ways: with a date stamp and with an ID byte.

than identifying the basic brand.

Savvy PC programmers know that IBM marks its PC models in two ways: first there is a date stamp—like this, "07/04/76"—that identifies the version of the BIOS. Second, there is an ID byte that identifies the most important model differences. The date appears on all the IBM machines as well as on some other brands, such as Panasonic; but some of the most important PC makers, like Compaq, don't give us this clue to the identity and version of their machines.

While it's nice to spot the date, it's not the most reliable way to identify the model of a machine, since upgraded BIOSes with new dates appear every so often. For IBM PCs, the model ID byte tells you the machine's model, with a few limitations. The ID byte is the next-to-last byte in the machine's memory, at hex address F000:FFFE.

The original PC was identified by a hex code of FF in the ID byte. The XT and a variety of other PC variants (the Portable PC, and PCs with a revised system board design) have a code of hex FE. Since several PC models use the same code, we can't uniquely identify each one, but at least we can identify the machine's type.

The poor old PCjr was so different from

the other IBM PC models that it needed its own unique model ID: hex FD. Likewise, the AT class has its own code: hex FC.

IBM has, of course, designed even more exotic models of the personal com-

puter, such as the 3270-PC, the AT-370, the RT, and others. You need to use some bizarre methods to identify each of these, but frankly I find them too weird to bother with.

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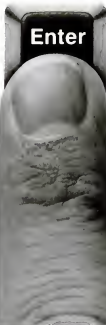
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Foldout slip-sheet

Folded edge of the page

1. Open the foldout page
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  1. Front side touching the free page
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Back

1. Follow instructions on the other side

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# LOOKING FOR THE ULTIMATE POP-UP



*The next generation of pop-up utilities should have memory-collision problems licked. Now software designers need to come up with niftier applications.*

By now, almost everyone on this planet must know the problems associated with pop-up utilities—or simply “pop-ups,” as most PC users are starting to call these memory-resident programs. (Both as historical footnote and in all fairness, I should point out that the term *pop-ups* was coined by and is a trademark of the Bellsoft people, in Bellevue, Washington.)

Load more than one of these little work-savers and you have a good chance they'll collide in memory sooner or later, disabling one another's features and maybe freezing up your machine. Load more than two, and the chances of that happening increase exponentially.

Many pop-ups demand to be loaded last. Few work with programs, such as *XyWrite*, that take over the keyboard. Some even share the same Alt key combinations.

And of course, they all eat up memory—lots of memory when you're having, as the beer commercial says, more than one.

## GOOD-BYE COLLISION WORRIES

The good news is that memory-collision problems should disappear in the next round of releases of these utilities. The informal standard-setting work going on among Microsoft, Borland International, Living Videotext, and other major players in the memory-resident program game will make it possible for well-behaved programmers to avoid most of the collisions. (If we can have “well-behaved programs,” we can surely have “well-be-

haved programmers,” can't we?)

And DOS 4.x's ability to address more of the memory we can stuff into AT-class PCs will mean that AT owners will at least be able to stack up new generations of pop-ups to their heart's content in all that RAM past 640K.

The bad news is that I don't think the kinds of pop-up utilities we can buy today even begin to serve the needs of most PC users. To use that ugly B-school phrase, we've suboptimized by a mile on what these programs do when we actually get them working.

I like *SideKick* and *Spotlight*. I also enjoy *Ready*. My laser printer and I both love *Printworks*. And the list goes on. But there's much more to life than memo pads and phone dialers and changing from a 10-character-per-inch Courier to a 12-cpi Letter Gothic.

For some time I've been asking PC users what they'd really like to see in memo-

ry-resident utilities—what kind of pop-ups would make them pay up, both in cash and use of RAM.

A surprising number have been innovative, insightful ideas, defining products a lot of us would like to be able to buy today. Herewith, I present to you a couple of these gems. For budding software tycoons, take 'em, they're yours. For the rest of us, maybe these few suggestions will provoke even better ideas for what we want to be able to pull up out of our machines' memories.

My own all-time favorite: a pop-up Hewlett-Packard 12C financial calculator. The 12C is a phenomenon, a paradigm of product design and longevity. For years now it has held the high ground in the calculator marketplace, and in a time of plummeting prices, it has also held approximately 90 percent of its original street price. Personal computers should have done so well.

Those of us who use them swear by them; there's nothing even close for time-money calculations. So the pop-up utility I'd most like to have would be an on-screen duplicate of the 12C. I want it to look and work just like the 12C, right through to the unit's kinky Reverse Polish Notation entry scheme. And of course I want to be able to print out, or cut and paste into a document, either a series of calculations or single displays from the device.

Of course, HP might not be so happy if such a product came out. I just want a 12C on my screen, not in my desk drawer, when I need to figure a bond yield or calculate a balloon payment.



## ■ JIM SEYMOUR

**MORE POP-UP IDEAS** Joel Irwin, PC coordinator at Exxon, and I were talking about how much we admire *Note-It*, the little utility that lets you annotate 1-2-3 spreadsheets. Why not, he mused, a utility

that lets you invisibly annotate anything on the screen—adding, say, a nonprinting footnote to yourself at the bottom of a letter to a customer?

Or, with enough memory in laser print-

ers such as Hewlett-Packard's Laserjet Plus to allow downloadable fonts, how about a printer utility that, at the stroke of a key, pops up and lets you specify that any marked block of text be printed in one of those external type fonts? The font itself wouldn't be memory-resident (or there'd soon be no available RAM for programs) but would instead be parked somewhere on your hard disk, probably in a subdirectory called Fonts, included in your PATH command. At print time, the utility would detect your command, snatch up the right font, send it on to the printer, and reproduce that patch of text in just the right typeface and size.

■ The pop-up utility I'd most like to have would be an on-screen duplicate of the HP 12C financial calculator. I want it to look and work just like the 12C.

Finally, how about a pop-up clock? One of the things that I find interesting about *Microsoft Windows* users is just how many of them like to stick that little analog clock face up in the corner of their screen. How about a simple, always-available clock—your choice of digital or analog display that can instantly be popped up anytime on anyone's screen, sans *Windows*? With, of course, a built-in and easy-to-set alarm beeper.

**ANY IDEAS?** Send me your ideas for the kinds of memory-resident utilities you would like to buy but haven't been able to find. Address them to: Jim Seymour, *PC Magazine*, One Park Avenue, New York, NY 10016. If I get enough good ones, I'll devote a column to them (crediting the sources, of course), and then we'll all sit back and see how responsive the software gurus are.

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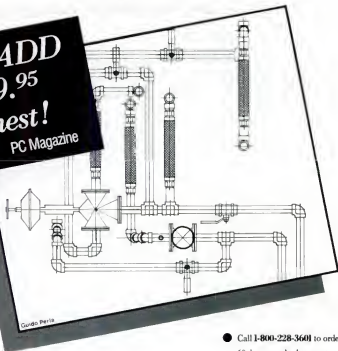
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■ STEPHEN MANES

# PAPER IS TRUTH

*Do computers cut down on the use of paper? If anything they increase it. Reality is that disks may make data more transportable, but it doesn't count until it's on paper.*



When I'm stumped for something to write about, the sure-fire solution is to phone industry analyst Malvina "Chrystal" Ball. The unflinching herald of the market dominance of CP/M-86, PCjr, the Macintosh, and *Ability*, as well as the dawning of The Age of Videotex, she is one of the most original thinkers in the business.

"Okay, Chrys," I said. "I need a scoop."

"What a coincidence! I'm tracking a company that's developing an RS-232 port-monitored ice cream maker. The theory is that the same 'yupscale' group that bought PCs is the nation's biggest market for premium ice cream. This could just be the most innovative product since *VisiOn*."

"Go on," I said.

**IT'S NOT CLICKING** "You can't fool me. I know you didn't take that down. I didn't hear those keys clicking."

"I'm using my laptop," I lied.

"Okay, Mr. Cynic. I don't think I'm going to bother giving you the lowdown on the little Texas startup that's working on a ROM chip to allow any IBM PC or clone to read DEC *Rainbow*-formatted disks."

"Don't tell me. The biggest breakthrough since *Old Mr. Boston's Bartender's Guide*."

"Mind if I use that? We were going with *Prolog* as the comparison, but I think you niched it better."

"Anytime," I replied. "But both my readers are looking for new perspectives, insights into important trends. By the way,

what's the Trend of the Month?"

"This month or next?"

"I'm not particular."

"This month's is Integrated Software. Let me quote from our report: 'If they continue their exponential growth, products that automate all the tasks common to most computer users will soon dominate the software market.'"

"Let's try next month's."

"Okay, if I can find it. The preliminary report is on my desk somewhere under all this crap. You're sure you won't release this before the first of the month?"

"Venture capitalist's honor."

"Here it is. Ready?"

"Like an unlocked version of 1-2-3."

"The Paperless Office."

Of course! How could I have missed it? I thanked Chrys profusely, told her we should have lunch at her expense next time she breezed through town, and autodialed my buddy Deke, the office manager.



**HELPLESS LAUGHTER** "How close to paperless is your office?" I inquired.

As timed by *The Norton Utilities*, the helpless laughter from the other end took 1 minute and 37 seconds to subside. "Damn," said Deke. "Now I've got the hiccups."

"And I've got a column to write. You can hold your breath later on. I thought your shop was computerizing everything."

"We've got a PC on every desk, and half of them are hooked into the mainframes. But that doesn't have anything to do with a paperless office."

"It doesn't?"

"Are you kidding? Electronics is fiction. Paper is truth."

"I knew I should've phoned somebody whose degree isn't in philosophy."

**CHECKLESS CHECKING** "Look, I'm talking reality. You guys who sit at home and talk on the phone and file your stories over modems and never run paper through your printers don't know what the real world's all about. The real world is that it doesn't count until it's on paper. Remember checkless checking?"

"Vaguely."

"Right. Are you really going to trust the bank to pay all your bills without a paper trail and wake up one morning to find that some computer glitch has missed seven mortgage payments and sent your house into foreclosure? What are you going to do then, bring your disk to the bank? Paper is power. That magazine you write for isn't on-line yet, now, is it?"

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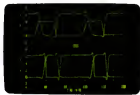
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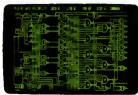
"Typical MICROCAP Transient Analysis"

works. In addition, you get even more advanced device models, worst case capabilities, temperature stepping, Fourier analysis, and macro capability.

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MICROLOGIC provides you with a similar interactive drawing and analysis environment for digital work. Using standard PC hardware, you can create logic diagrams of up to 9 pages with each containing up to 200 gates. The system automatically creates the netlist required for a timing simulation and will handle networks of up to 1800 gates. It provides you with libraries for 36 user-defined basic gate types, 36 data channels of 256 bits each, 10 user-defined clock waveforms, and up to 50 macros in each network. MICROLOGIC produces high-resolution timing diagrams showing selected waveforms and associated delays, glitches, and spikes—just like the real thing.



"Typical MICROLOGIC Diagram"

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Regarding MICROCAP... "A highly recommended analog design program" (PC Tech Journal 3/84). "A valuable tool for circuit designers" (Personal Software Magazine 11/83).

Regarding MICROLOGIC... "An efficient design system that does what it is supposed to do at a reasonable price" (Byte 4/84).

MICROCAP and MICROLOGIC are available for the Apple II (64k), IBM PC (128k), and HP-150 computers and priced at \$475 and \$450 respectively. Demo versions are available for \$75.

MICROCAP II is available for the Macintosh, IBM PC (256k), and HP-150 systems and is priced at \$895. Demo versions are available for \$100.

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## ■ STEPHEN MANES

"Some of the programs and stuff are," I responded defensively.

"Sure. Great. Electronics is super for swapping concentrated hunks of data, particularly time-sensitive stuff like stock prices. But nobody wants to stare at a screen to scroll through a 27-page report or maneuver through a 500 by 500 spreadsheet. Besides, hand somebody something on disk, and there's a monumental urge to futz with it. And there's no record of what's been futzed up. You can't miss an erasure or a big scrawl in bright red pencil."

"But the computer must be doing something to reduce paperwork."

**TENNIS SHOES** "Reduce it? Hell, it's probably doubling it. It's just like the Xerox machine. Before Xerox, five carbons were the maximum extension of anybody's ego. Now everybody and his sister sends stupid memos to half the company. And the computer makes them even easier to generate. Guys with Macintoshes decorate their memos with cute little pictures of tennis shoes."

Deke was just getting started. "And don't even talk to me about spreadsheets! Before the PC, the only person who'd ever heard of a spreadsheet was some old guy in a green eyeshade on a high stool in a corner of the accounting department. Now even secretaries generate the damned things, and revisions, and revisions of revisions. It's so easy to print out multiple versions of everything that everybody does it. And they never get it right the first time, so they format and reformat until everything lines up perfectly. Believe me, nobody worried about formats in the days of Wite-Out."

"What about electronic mail? Shared information?"

"It's an extra dimension, that's all. We're geared for a paper world. We've got printers so fast the biggest problem is keeping them loaded with paper. We've got color plotters for charts. We've got binding machines for reports. In the real world, people show up at meetings with briefcases full of paper, not floppy disks. Face it: no one thinks you're working unless you're generating paper."

"Look, I need a column. Have you got a trend for me, or what?"

"Sure. Till now, the major limitation

on paper generation was the headache you got from printer noise. With the new laser jobs, that's all a thing of the past. Besides, they're so complicated to format, people are making more copies than ever. Just

look at any mail-order catalog, and the next real growth product will stare you in the face."

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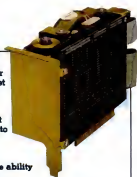
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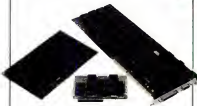


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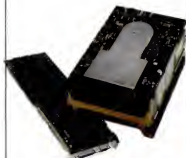
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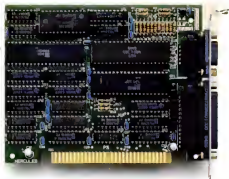
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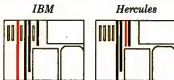
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## ■ STEWART ALSOP

# RUMORS, RUMORS

*IBM will soon introduce a new computer based on the 80386 chip. Or will it? The jockeying for position among the industry's major players may delay this announcement for a while.*



Sometimes it seems that the personal computer industry is fueled by speculation about IBM's unannounced (and sometimes not even contemplated) computers. The rumors have gathered steam three times in the last 2 years, when IBM was supposed to introduce the Peanut (PCjr) in the fall of 1983, the PC II (IBM denies its existence) last spring, and the Clamshell (a laptop, not introduced as of this writing) earlier this year. Now the rumormongers are whispering about when IBM will bring out a new computer that uses the new Intel 80386 microprocessor. Their conclusion: the computer will be out by the end of this year.

The 80386 chip is compatible with all previous versions of the family (8088, 8086, and 80286). Yet it is so powerful that it runs at least two to three times as fast as current implementations of the 80286; it allows applications programs to address 64 gigabytes of memory and 34 terabytes of disk storage; and it will run multiple applications on top of multiple operating systems, given enough memory.

**FACT OR WISHLFUL THINKING?** But don't hold your breath waiting for a PC that uses this dazzling new chip. There's an excellent chance that IBM won't introduce such a computer for at least 2 years. And the reasons for that lag in development are fascinating because they reveal some of the inner workings of the personal computer industry.

The reason that the rumormongers think there will be an 80386 computer from IBM so soon is based partly on fact

and partly on wishful thinking. The fact is that Intel has announced that it will be producing volume quantities of the 80386 by early this summer. That means IBM could, if it wanted, produce a new computer by December or January, particularly since the company has been involved with the design of the new chip and has had samples of it since last fall. The wishful thinking is that just because the 80386 is a computer designer's dream come true, IBM will make a machine using it.

**SOLVING 80286 PROBLEMS** Indeed, an 80386-based computer from IBM would almost instantly solve many of the problems inherent in machines that use its predecessor chip, namely the 80286 processor used in the PC AT and compatibles. I won't go into all the technical details (since I don't really understand them anyway), but when Intel designed the 80286 processor, it didn't allow for a way to easily

ly redesign MS-DOS so that it could directly address all 16 megabytes of the chip's potential memory space. The main reason is that Intel did most of the basic design work on the chip by 1983, well before it or any other company realized that DOS would become such a dominant standard.

When Intel designed the 80286, it extended its power by giving it two modes: "real," which emulates the 8088, and "protected," which provides the chip's extra memory and faster processing. The problem is that the company made it difficult to switch between modes because it believed the industry would eventually move up to a macho operating system like UNIX, which does operate in protected mode. Since the 80286 will not switch modes, programs running on DOS 3.0 on the PC AT can only address the same 640K bytes of RAM as they can running on DOS 2.0 on the PC-XT. As a result, 80286-based computers end up being simply faster versions of the PC-XT.

So because the industry didn't move DOS applications to UNIX, as Intel had expected, and since speed alone doesn't justify the \$2,000 premium commanded by the PC AT and compatibles, as IBM had expected, 286 machines haven't been as widely embraced as their earlier brethren. This has frustrated software developers in their attempts to push the machines to provide ever more comprehensive and powerful solutions.

**A CLEAN WAY OUT** Then along comes Intel's newest microprocessor, the 80386. Intel designed the 80386 chip in close co-





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- 12) Improved budget reporting module.
- 13) Improved integration with other modules including Payroll.
- 14) Supports multiple departments
- 15) Flexible chart of accounts.
- 16) Prints financial statements defined formats.
- 17) Prints Income Statement by quarter, and 3 years.
- 23) Prints Departmental
- 28) Statement and Balance Sheet by month, current quarter, quarters.
- 29) Prints Budget Comparison
- 30) Income Statement and Balance Sheet comparing Actual vs. Budget with variances and ratios.
- 31) Prints Trial Balance and Chart of Accounts
- 32) Prior Period Adjusting Entries do not impact current results.
- 43) Data Entry screen displays beginning, current and ending balances as well as the last 10 entries.
- 35) System allows new accounts to be created during data entry.

### Accounts Payable

- 36) Vendors may be added to system during the entry of invoices.
- 37) Simplified selection of vendors and invoices for payment.
- 38) Provides for entry, updating and deletion of vendor information.
- 39) Allows entry, editing and posting of payables, adjustments, cancellations and prepaids.
- 41) Prints the Open Item # Cash
- 42) Requirements reports
- 43) Allows partial payments.
- 44) Prints A/P checks
- 45) Prints Check register.
- 46) Prints the A/P distributions to the General Ledger
- 47) Prints the vendor analysis report.
- 48) Interfaces to MCBS General Ledger or may stand alone.

### Accounts Receivable

- 49) Customize your own headings on Invoices and Credit Memos. No programming required.
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### Accounts Receivable cont.

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- 53) Allow up to 99 repetitive line items for fast invoicing
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- 55- Prints Invoices, Credit Memos
- 57) and Statements.
- 58) Prints Sales Analysis.
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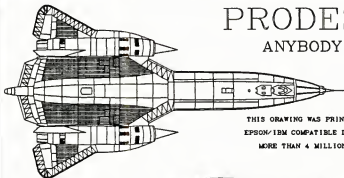
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# MICRO TO

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# MAINFRAME

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## MAKING THE RIGHT CONNECTION

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**T**he complex task of mating micros and mainframes is becoming increasingly important, even urgent. A 1985 study by Future Computing noted that by 1989 more than 28 million PCs will be installed in businesses—more than four times the 1984 installed base of 6.3 million. At least 45 percent of the PCs used in large corporations already have been connected to a host (mainframe or minicomputer)-based network, and 76 percent of all Fortune 2000 companies want to be able to connect PCs with mainframes.

To make this connection successful, you must consider many technical and operational variables: several alternative solutions apply to each problem. These micro-to-mainframe articles and product reviews (and other articles to come) are designed to make the decision process as painless as possible by breaking the huge and confusing micro-to-mainframe problem into manageable pieces. They focus on the variables involved in making the electrical and communications links between these two types of computers. Let's start with a simple tutorial on some of the factors you have to consider and a decision-support diagram that can help you plot your course. Finally, we'll review the performance of some real equipment.

There are three good reasons for connecting your PC to a large-

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## ■ MICRO TO MAINFRAME

er host computer system. First, opening communications between your PC and a host computer lets you run programs that exist on the host machine using the PC as a terminal. Second, if you develop mainframe software, you can create, compile, and debug programs on the PC and then load the source code into the host for it to recompile and run. Finally, with the right PC/host software you can exchange data between the two machines.

In the first application, the PC acts as a terminal off the host machine. Many corporations and institutions established their core programs and databases on mainframes well before personal computers entered the office scene. You may use a PC for word processing, spreadsheets, and other personal productivity tasks, but if you want to get into the corporate accounting system or inventory records, you often need to access the mainframe programs through a dedicated terminal. Either you have two screens and keyboards sitting on your desk or you make the PC do double duty. At a minimum, a PC working as a terminal can save space, but more practically it can capture data from mainframe programs for local processing.

Using a PC to create mainframe programs can save you time and money and add security. In the simplest scenario, any of the excellent text editors available for PCs can be used to create source code that can be uploaded to the mainframe for compiling and debugging. PC editors are often faster and more powerful than editors supplied on operational mainframe systems. But the speed and capacity of today's desktop systems make it possible to first compile and debug the code on the PC before it is sent to the mainframe. Mainframe time is expensive and code debugged on a PC first is less likely to do unspeakable things like trashing files on the mainframe the first time it is run.

The third typical micro-to-mainframe application embodies the ideal relationship between a PC and mainframe. In an ideal situation, if you asked for some information from a PC database management system that is not present in the PC, the PC should invisibly communicate with the mainframe to obtain the information. Several mainframe database manager manufacturers now have PC programs that link



*Your company's mainframe may contain information that is useful or indispensable to you. To access it, you must have the right hardware—and that depends on such factors as the mainframe itself, its location, and the operating system it runs. You must also have, in most cases, the cooperation of your company's MIS department. Pictured here, an IBM 4341 mainframe.*

to mainframe software and approach this ideal. IBM has announced programming tools that should make this useful relationship more common between other kinds of application programs.

But getting your PC to behave as a terminal or establishing a method of transferring files between the big and little ma-

chines can be frustrating. Problems of communications protocols, screen displays, and file formats can stand between your PC and the host you want to use.

**ASYN ASCII** The first obstacle is the way the data is arranged on the communications line and the data alphabet the host

computer uses. The PC normally uses a data protocol and data alphabet that are not native to larger IBM systems.

The PC's RS-232C serial communications port is an asynchronous device. The term **asynchronous** means that each character is sent down the line along with bits marking its beginning and end. The sending and receiving machines don't have to be synchronized to tell when the bits representing a character start and stop. This method of sending data is efficient and economical as long as the exchanges don't involve megabytes of data. But for IBM mainframes and other large systems with a lot of data to move, a system called **synchronous** transmission is more efficient.

The **synchronous transmission** scheme packages characters together and eliminates the start and stop bits used to define each character. This packaging requires sophisticated equipment at both ends to keep synchronization between the sending and receiving machines. Most personal computers use asynchronous transmissions, but many large host computers normally use synchronous transmission and can only communicate in the asynchronous mode through special added equipment.

IBM's particular method of performing synchronous communications is called **Synchronous Data Link Control**, or **SDLC**. Other mainframes depend on protocols that are very similar (such as Burroughs's **BDLC** & Sperry's **UDLC**); they all conform to the International Standards Organization High-Level Data Link Control standard.

**DATA ABCs** Another potential source of problems for micro-to-mainframe communications is the data alphabet, the code used by the computer to convert its bits representing 0s and 1s into letters and numbers. Morse code, for example, is a data alphabet that arranges groups of long and short pulses into letters and numbers.

Personal computers use a data alphabet called the **American Standard Code for Information Interchange**, or **ASCII**. Some mainframe manufacturers use this American standard code in their large computers too; one grand exception is the largest American computer company, IBM. Big Blue uses its own data alphabet

(**Extended Binary Coded Interchange Code**, or **EBCDIC**) in all of its systems except the PC line. Because of IBM's clout in the marketplace, many other manufacturers also use EBCDIC in their mainframes.

Before you can plan the configuration of your PC, you have to know if your potential host can communicate using asynchronous ASCII. Host systems made by IBM and other manufacturers can communicate using asynchronous ASCII if they are equipped with the proper hardware and

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## ■ Problems with communications protocols and screen displays can stand between your PC and the host.

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software, but if the host isn't equipped this way, you may either have to supply a translation device called a **protocol converter** or add special hardware and software to your PC to give it the capabilities you need to communicate.

**EMULATE AND COMMUNICATE** Terminal emulation can be an important consideration if you are trying to exchange data with or run programs on a traditional host computer system. To emulate means, of course, to act like something else. In order to communicate with many types of larger computers, your PC may have to act like a specific kind of terminal or communications device.

Inexpensive, so-called **dumb terminals** do no more than present on-screen the information sent from the host; they do not process it locally. Host computers serving many terminals are usually designed, however, to off-load some of the display processing burden onto the terminals. These "smart" terminals, which are not usually considered personal computers, contain microprocessors of the 6800 or Z-80 class; they also contain software in ROM that causes them to respond to commands from

the host computer in certain ways. A simple smart terminal such as the Lear-Siegler ADM-3A may only be able to blank the screen, display reverse video, and ring its bell in response to commands coming over the data line. Other more powerful terminals, such as the IBM 5080 graphics workstations, can illuminate any pixel on the screen, display two- and three-dimensional drawings, and rotate figures on the screen under control of the mainframe software. The terminal operator sends commands for these operations to the mainframe, which interprets them and then instructs the terminal about how to respond.

Program designers usually assume that you will use a certain type of terminal with their software, and they develop routines that take advantage of whatever capabilities that terminal possesses. Most modern terminals allow a programmer to create attractive screens with highlighted words and characters, graphic boxes, and messages that demand attention by blinking. The screen display of a modern program is often designed to look like a paper form or special report. These attributes make programs more effective and easy to use.

The situation wouldn't be too bad if the terminal manufacturers agreed on a standard set of commands that always evoked specific actions. The American National Standards Institute (ANSI) has approved a standard set of commands for terminals, but unfortunately the **ANSI terminal standard**, like the RS-232C signaling standard, is interpreted in many different ways by different manufacturers and ignored completely by some. Manufacturers often use unique commands in their terminals that may not even be consistent throughout their own product lines.

The most popular group of asynchronous ASCII terminals used in the United States is the VT-100 family manufactured by Digital Equipment Corporation. The DEC VT-100 is almost synonymous with the UNIX operating system, and most UNIX programs were written to take advantage of this terminal's capabilities.

The VT-100 has features that in some ways exceed the PC's capacity to emulate them. Its smooth-scrolling feature makes text flow onto the screen. It can display double-high and double-wide characters

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## NAVIGATING A PATH TO THE MAINFRAME

*Following this decision matrix will help you chart a smooth course through the micro-to-mainframe maze.*

If you want to connect a personal computer to a host mainframe or minicomputer, you have some research to do and several decisions to make. Following this diagram and working through its decision process to a conclusion will lead you to the right ball park. You will still have to buy tickets, get your own popcorn and soft drinks, and find your seat.

Starting at the top left of the diagram, note that this decision tree is good only for connection to those mainframes and microcomputers that follow the IBM 3270 communications model. (In upcoming issues we'll look at 5251 terminal emulation, associated with the IBM System 34, 36, and 38 series. The decision path for that group of computers is slightly different.) Some machines from other manufacturers use the same IBM Bisync or SDLC protocols for communications, but many do not. Connecting to DEC or Wang systems, for example, involves completely different tasks. You may be able to connect a PC to a DEC system quickly using one of the dozens of communications products that emulate a DEC terminal, but you will have to search for a specialized card to make the Wang connection.

After you confirm that you want to connect to an IBM-type device, you need to determine whether your host system is local or distant (over 1/4 mile away). Proximity makes a big difference in the speed of the connection you can establish and the kind of electrical connection you must use.

If your host is local, the decision tree branches down to coaxial cable alternatives. If the system is remote, you have to access the host through telephone lines, and again there are several options. (One additional possibility is accessing a remote computer through a very-high-speed leased communications circuit, but

this circuit can probably be treated as a local device.)

**THE COAX CONNECTION** Answering "yes" to the local-host question leads you directly down to a question about local area networks. If your PCs are connected by a local area network, the most efficient path to the host will be through a network gateway that emulates

■ Proximity makes a big difference in the speed of the connection you can establish and the kind of electrical connection you must use.

the IBM 3274 network controller. If the PCs are not hooked up to a LAN, you need to check to see if coaxial cable has been run from the mainframe system to the vicinity of the PCs and if expansion slots in the PCs are available.

Running coax can be costly. The absence of coaxial connections may indicate that you should use a device called a protocol converter rather than a terminal emulation card. Another incentive for going this route is that running coax means losing a valuable expansion slot in your PC because the coaxial connection requires an adapter card. If no slots are open, you have to either reconfigure the PC or answer "no" and go the protocol converter route. Protocol converters can be a very economical way to solve the micro-to-mainframe problem.

If you find that you have or can afford to install coaxial cable between the host and the PCs you want to serve and that all PCs involved have an open slot, then you can choose from a large number of 3270 interface cards. Adapter cards for the 3270 family of protocols are marketed by companies such as DCA, Quadram, AST, CXI, Foe, and IBM. (See "A Window on the 3278 World" in this issue for reviews of eight 3278/9 coaxial terminal emulation cards.)

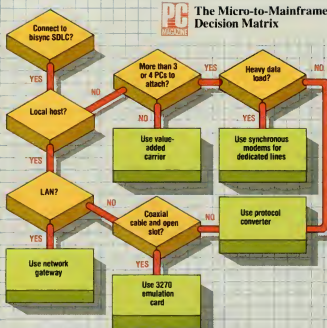
**VALUE-ADDED CARRIER** Now move back up the decision tree to the question about a local host. If the host system is not local, you need to find the best way to cram a lot of data through the telephone lines. How much data you need to send is probably determined by the number of PCs you want to connect. For just three or four PCs, the most economical route might be to establish an account with a value-added carrier like Tymnet or CompuServe. The "value" these carriers "add" includes conversion of speed between host and terminal devices and conversion of different communications protocols—not unlike the functions of a protocol converter.

Your bills for value-added services can mount by the minute if you have a lot of data to transfer. It might be better to establish your own long-distance links (although considerations of investment and maintenance costs may give the value-added network solution some appeal, even in heavy data situations).

**LEASING YOUR OWN** If your data load is heavy and you have several terminals, consider establishing communications using synchronous modems and high-speed communications circuits. These connections depend on the establishment of a "modem pool" and com-



## The Micro-to-Mainframe Decision Matrix



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munications arrangement at the host end. Synchronous modems normally run at speeds between 1.2K and 9.6K bits per second. The fastest modems rely on leased, full-period telephone lines. Leasing these lines can be expensive, and deciding between making your own connections and using a value-added network is often the subject of intense cost/benefit analysis. Internal synchronous modems now available for the PC take care of the EBCDIC/ASCII conversion and terminal-emulation tasks.

If the data traffic to a remote host can be satisfied by 1,200- or 2,400-bit-per-second modem lines, then the protocol converter shows up again as a potential answer to the connection problem. In this case, the protocol converter would be placed next to the host and connections

made through normal asynchronous modems operating on voice-grade telephone lines. This allows the simultaneous connection of several PCs to the host, but at speeds of up to 2,400 bps.

**NO GOODIES YET** After going through this decision process and finding your way to a seat, you can watch the game but you still won't have any popcorn. This level of PC-to-host connection will allow your PC to act as a remote terminal and perhaps to exchange simple files, but the problems of downloading data in a form that is useful for the PC's programs and vice versa still loom before you. Another entire level of micro-to-mainframe challenge awaits you at the applications program level.

—Frank J. Derfler, Jr.

and text up to 132 columns wide. The PC cannot duplicate these functions, but some programs present good alternatives.

Other common asynchronous ASCII terminals that host systems can use include the Heath/Zenith H-19, IBM 3101, ADM-3A, and TeleVideo 900 series.

**IBM SNA** IBM's System Network Architecture (SNA) is a comprehensive specification for distributed data-processing networks (that is, arrangements of computers in which small computers handle simple tasks and large, central systems manage complex processing). SNA also refers to a set of products designed to perform communications for and allow communications with host systems.

On the host side, SNA includes programs and operating-system modules such as the **Advanced Communications Function for the Telecommunications Access Method (ACF/TCAM)**, **Advanced Communications Function for the Virtual Telecommunications Access Method (ACF/VTAM)**, and the **Advanced Communications Function for VTAM Entry (ACF/VTAME)**. If you are around people working in the classic IBM data processing environment, you will hear them talk about "vee-tam" and "tee-cam." All of these products control communications between terminals or terminal emulators and the host.

Other programs on the mainframe work with VTAM or TCAM to provide access. These include the **Time Sharing Option (TSO)** and **Virtual Storage Personal Computing (VSPC)**. VSPC may be particularly interesting to people using PCs because it can provide prompts to attached PCs that allow the entry of batch jobs for processing by the host computer.

Even short descriptions of the functions and options in these and other IBM mainframe communications programs could fill this entire magazine. It's such a complex subject that the most important guideline I can offer is: You must consult with the people who run your company's mainframe. They may know nothing about PCs; in that case you will have to describe the communications options available at the PC along with the 3270 emulators that you have to see how they can be matched to the host system.

## ■ MICRO TO MAINFRAME

**IBM 3270 TERMINALS** The most widely sold and copied synchronous family of terminals are the **3270 communications systems** marketed by IBM. The 3270 family includes devices called **controllers** that concentrate the communications of many terminals and printers.

The two most common controllers in the 3270 family are the **3274** and **3276**. The most commonly used terminal is probably the **3278**, which has a monochrome screen display. The **3279** is a similar device for color graphics. (See accompanying article, "A Window on the 3278 World").

Factors such as keyboard mapping, video presentation, and the use of an attached printer are important in the emulation of 3270 terminals. These terminals have many keys that are not present on the PC's keyboard or the keyboards of other terminals. During emulation, then, many of the PC's keys are called on to do double duty. Similarly, the PC video card can't do some 3270 video tricks, so the emulation adapter must use alternative presentation methods. Mainframe systems often treat printers as separate peripherals that they communicate with through the terminal. The mainframe program may expect to use a local printer in this way. If you are using a PC as a remote terminal, emulating the characteristics of a specific type of 3270 device can be an important job for the PC communications software.

### **SIMULTANEOUS TRANSLATION**

Because of the technical differences between IBM-type mainframes and PCs, any devices that connect them must make simultaneous translations and conversions. Hardware and software have to adapt the mainframe's EBCDIC data alphabet signals that come over coaxial cable in the SDLC transmission protocol to the PC's ASCII architecture. They must lend the PC the ability to respond to the screen formatting and printer control commands of the IBM 3278 or 3279 terminals.

There are several ways to accomplish these conversion and translation tasks. We are tackling the most-common approaches by reviewing two categories of products allowing the connection of PCs to mainframes: terminal emulation cards and protocol converters. Each of these major cate-

gories has subcategories determined by the method of connection and type of emulation they perform. (3278/9 terminal emulation cards are reviewed in this issue; protocol converters and other emulation cards will be covered in future issues.)

A terminal emulation card gives the PC the ability to communicate with a mainframe or with a communications controller attached to a mainframe. The three subcategories of emulation cards are 3278/9 terminal emulators, 3274 controller emulators, and 3276 controller emulators.

## ■ You must consult with the people who run your company's mainframe—and they may know nothing about PCs.

Some only emulate 3278/9 terminals and must have a 3274 or 3276 controller between them and the mainframe. Others emulate the cluster controller and take a channel on the CPU. To make it interesting, some emulate the 3274 controller and others emulate the 3276 controller. There is a big difference in the way these are handled in the mainframe.

**Protocol converters** are small computers that convert between the host's coaxial wiring and PC's RS-232C wiring, between IBM's EBCDIC data alphabet and ASCII, and between screen display codes and PC screen capabilities.

Some protocol converters can connect from one to a dozen PCs to a host. Multiple-port devices may be able to address different ASCII terminals on each port. A protocol converter is usually connected to the host as a 3274 communications controller. The PC attaches to the protocol converter through the RS-232C serial port and runs communications software to move the data in and out of the port.

In some installations, a protocol converter with multiple ports is located near the host machine, and communications lines are extended using RS-232C cables

or modems attached to telephone lines. In other situations, a single-port protocol converter is located next to the PC, and the connection to the host is made over the typical 3270 coaxial cable installation.

A **multi-port protocol converter** offers economy of scale and possibly lower-cost connecting cable. It may, however, slow down under heavy data loads. A **single-port** device can take advantage of existing cabling and usually performs as fast as the RS-232C link will allow.

Many protocol converters are designed to work with low-cost ASCII terminals such as the ADM-3A or VT-100. You may have to run software in the PC designed to emulate the terminal that the protocol converter thinks is attempting to emulate the 3270-type terminal. Double emulation can create havoc with keystroke equivalents. When we review protocol converters in upcoming issues, we will alert you to the protocol converters that can work directly with a PC without double emulation.

**BEYOND CONNECTION** There's more to achieving synergy between a micro and a mainframe than merely making the connection. A wide variety of programs is available to help exchange data between micro and mainframe systems.

IBM has described specialized Logical Unit session software that will allocate host buffer and processor resources to PCs. Some mainframe software vendors have released packages that exchange data between PC programs and mainframe programs, but these are usually limited to one particular mainframe application. IBM has said it will release a programmers' tool kit of communications routines for applications in the "second quarter of 1986" that will give PC and host programs universal abilities to make data exchanges. Of course, applications programs will have to be rewritten after the tool kit is released.

We are a year or more away from universal application-to-application communications between micros and mainframes, but the first step in making use of the mainframe is to get connected. And if you take a well-informed approach, tying into the mainframe may be easier than you think. ☐

*Frank J. Derfler, Jr., is a contributing editor of PC Magazine.*



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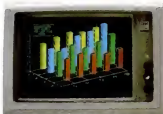
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## THE FORCE IN MICRO TO MAINFRAME

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# A WINDOW ON THE 3278 WORLD

*If your office uses 3278 terminals and PCs, you can plug a 3278 emulation card into the existing cable, make your PC do double duty, and bid your terminal farewell.*

**Y**our office is dotted with IBM 3278 and 3279 terminals. The floors in your building conceal a tangle of coaxial cable. The work your company does lives and breathes through these connections with your company's mainframe.

Within the past few years, however, IBM PCs have been introduced to the office, and now your company can't live without them. Often the same people do different jobs on the 3278 and the PC. Secretaries rely on 3278 terminals for data entry and use PCs for word processing; research analysts use the 3278 for RAMIS (Rapid Access Management Information System)

and the PC to run 1-2-3. Assistant vice presidents write financial models in BASIC on their PCs at home but often need data buried within the mainframe. And just last week you watched with astonishment as somebody brought up a screenful of numbers on a 3278 and read them off as someone else sitting nearby typed them into a PC spreadsheet.

Your office is a prime candidate for 3278 emulation boards for the IBM PC.

For companies that already have coaxial cables strung throughout the building connected to 3274/6 controllers on one end and 3278/9 terminals on the other, replacing the 3278s with PCs is most easily accomplished by installing one of the



## ■ 3278 EMULATORS

3278 emulation boards reviewed in this article.

In the simplest case, you open up the PC case, put the 3278 emulation board in one of the slots, and close up the case. You disconnect the coaxial cable from the back of the 3278 terminal and connect it to the emulation board. You take the disk that comes with the board, put it in the PC drive, and enter the name of the emulation program. Then, as if it were the most natural thing in the world, your mainframe corporate logo pops up on the PC screen waiting for your log-on command.

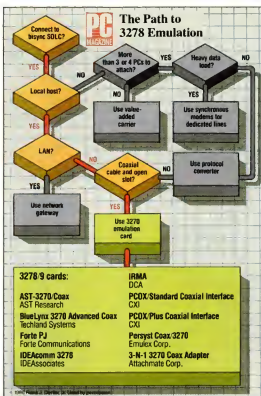
You may then move the old 3278 terminal from your office into the hall. You no longer need it.

Although many emulation boards have DIP switches and jumpers for different I/O addresses and interrupt levels (usually factory-set to the most reasonable selections) and although some of the emulation software initially requires you to run a short installation program, in many cases the transition from freestanding PCs and 3278 terminals to a combined PC and 3278 emulator is quick and easy.

Yet despite the appeal of this step, there are certain questions you must ask yourself before taking it.

**WHO ARE THE USERS?** As the reviews that follow will show, the market offers many different approaches to 3278 coaxial emulation. When you ultimately choose a board, your decision will be based partly on these factors: who will be using the 3278 emulation software, whether your primary concern is that the software makes the PC keyboard closely emulate a 3278's, and whether file transfer is important. It would not be unreasonable to install different 3278 emulation boards for different users in the same organization, depending on how they will be used.

You'll probably find two main classes of people who could benefit from using an



IBM PC with a 3278 emulation board. The first class comprises hardcore 3278 users who have little previous PC experience. These mainframe program developers may find, for instance, that they can work more efficiently if they download their programs from the mainframe to the PC, do some editing, compiling, and even simple debugging on the PC side, and then upload the programs back to the mainframe for more extensive testing. This process takes some of the load off the mainframe and may even allow faster editing on the PC, which is independent of mainframe downtime.

Or, due to request congestion in your data processing department (the "We'll probably be able to get to this early in 1988" syndrome) or budget constraints, these 3278 users may find it easier to do

some local PC programming (say, in BASIC) for some data entry or calculation jobs. The BASIC program could then put the data in a form that the mainframe system can already handle, and you can upload it to the system.

Your veteran 3278 users might find some advantage to using a PC even without any mainframe file transfers—for instance, for some quick calculations necessary to fill in a gap in the mainframe software.

In the second class of people who may benefit from 3278 emulation boards are IBM PC users who see a need for some mainframe interaction in their lives. These could be analysts whose jobs have, over the decades, taken them from adding machines to electronic calculators to PC spreadsheets. The numbers they use generally come off computer runs printed on the mainframe. The sight of people sitting down with a stack of mainframe output and typing numbers into a PC spreadsheet is not unusual in this situation, but it is highly inefficient. Downloading the data directly through a 3278 emulation board can help.

On the managerial and corporate level are many people who, after being given a PC in the privacy of their offices, have conquered computerphobia and might by now consider themselves power users. Their expertise in jobs like financial modeling makes the combination of a PC spreadsheet and mainframe data a very powerful tool. They might even find that some mainframe software (like RAMIS) is better suited to their computer tasks.

You don't really lose any of the functionality of your PC with a 3278 emulation board, even in the middle of a 3278 session. Many of the emulation programs can remain resident in memory. You can easily flip back and forth between the PC command level (or a PC program) and the 3278 session just by triggering the hot key. Some emulation programs, perhaps in-

spired by IBM's 3270 PC, even use separate windows for one (or sometimes more) mainframe sessions, a couple of notepads, and DOS.

**NEAR-FLAWLESS EMULATION** The 3278 emulation boards reviewed here all come with dedicated software that, in conjunction with the board, takes care of the many differences between the PC and the 3278 terminal. In the preceding article, "Micro to Mainframe: Making the Right Connection," Frank J. Derfler, Jr., discusses some of the problems involved in PC terminal emulation. In actual use, all of these problems are well handled by the 3278 emulation boards and software—except one.

ASCII and EBCDIC conversion is usually not a real problem. This conversion occurs behind the scenes, and, except for encountering those few seldom-used characters that cannot be precisely converted, you will probably never realize that this conversion is going on.

The bottom status line on the 3278 contains symbols not reproducible on the PC. These symbols include little boxes, a figure with outstretched arms, and a clock that indicates the system is busy doing something else and will get back to you "soon." The emulation software's approximations to these symbols are usually pretty good and you will get accustomed to them quickly; this is not a real problem either.

Some of the programs can even handle emulation of 3278 and 3279 displays that go beyond the 24-line by 80-column standard and have 32 lines, 43 lines, or 132 columns. In general, the emulation programs accomplish this feat by scrolling the PC display. This scrolling may be a nuisance, but, again, it's not a problem.

Then there's the matter of the keyboard—and that is a real problem.

**FINGERTIP MEMORY** It seems sometimes as if your fingers themselves learn a particular keyboard. They reach for the Backspace, stretch for the cursor keys, and slap Enter with little conscious intervention. Your fingers may now be very comfortable with a PC keyboard or one on a 3278 terminal. Introduce a 3278 emulation product on the PC, however, and your fin-

gers are in for a real shock.

At first glance, the keyboards on newer models of IBM's terminals look similar to the PC keyboard, but a closer examination reveals many considerable differences. The 3278's Alt key, for instance, is located on the bottom row of the keyboard to the

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## ■ You don't really lose any of the functionality of your PC with a 3278 emulation board, even in the middle of a 3278 session.

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right of the Space bar where the PC CapsLock key is. The 3278 Enter key is to the right of the Alt key. The 3278 CapsLock is where the PC Ctrl key is. The position of the Alt key on the PC is used by the Reset key on the 3278. The Enter key and PrtSc key on the PC are at the same position as the Back Tab and New line keys on the 3278.

On both the 3278 and the PC, the Z key and Left Shift are separated by another key, and so the classic PC keyboard problem of the displaced Left Shift is duplicated on the 3278. On the PC, however, this intervening key is the Backslash; on the 3278, it's the Angle bracket key.

In the area where the PC's function keys are located, the 3278 has some specialized keys: Erase input, Erase to end of field, Cursor blink, Attention, and others. Function keys on a 3278 are called PF (program function) keys. These keys generally use the Alt key (to the right of the Space bar, remember) combined with the numbers on the top row of the keyboard.

The 3278 keyboard has four cursor movement keys—up, down, left, and right—grouped in a square (unlike the PC diamond) at the right. The 3278 Insert and Delete keys are above the cursor keys, not under them as on the PC.

Now, given this mess (and my description is by no means complete), how would

you emulate the 3278 keys on the IBM PC? Would you try to make each PC key perform the same function as the equivalent on the 3278 (for instance, make the PC function keys do the PF tasks)? Or would you try to redefine the PC keys so they approximate the positions of the 3278 keys (for instance, make the PC Enter key function as New line)? How confused are you willing to be when you switch between 3278 and PC applications?

What's worse is that some users will have to contend with *three* keyboards: a real 3278's, a PC's running PC programs, and a PC's when performing 3278 emulation. Fortunately, many of the emulation programs allow you to redefine the keyboard so that you can do it the way you think makes most sense. But this flexibility may make things worse.

A case in point: One of the emulation programs I tested defined the PC Enter key as the 3278 New-line key (in about the same position and labeled nearly identically). The PC End key served as the 3278 Enter. I was outraged by this. I kept hitting the PC Enter key when I wanted to enter. The cursor dropped down a line but nothing happened (that's what the New-line key does). The system wouldn't respond (as it shouldn't have) until I would realize my mistake and press the End key for Enter.

I quickly learned how to redefine the keyboard in this program and I transferred the 3278 enter function back to the PC Enter key. Now I felt comfortable with it. After I used the emulation program like this for a while, I turned to a real 3278 sitting nearby for some comparisons. But I couldn't get it to work. I kept typing things in and hitting Enter. The cursor dropped down, but the system wouldn't respond. What was wrong? I wasn't pressing Enter. I was pressing New line.

**TRANSFERRING DATA** Even when you consider the keyboard problems you'll have, it's generally convenient to have one machine serving the purposes of two. But the merging of the PC and 3278 also has another beneficial synergistic side effect—it permits you to transfer data between mainframe datasets and PC files.

This transfer can go in either direction: you can upload from the PC to the main-

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## ■ 3278 EMULATORS

frame and download from the mainframe to the PC. The various ways in which these 3278 emulation boards and software provide for file transfer often mark their greatest differences. But, in general, the methods can be broken down into three categories.

Perhaps the easiest approach to downloading data is simply for the emulation program to capture screen images on disk files. Just as pressing Shift-PrtSc on the PC dumps the contents of the screen to a printer, another key combination may trigger the emulation program to save the contents of the screen to a PC disk file.

If each screen dump can be appended to the same PC disk file, then you can page through the mainframe dataset that contains the data you want and dump it to the file one screen at a time. The resultant file will be an accumulation of these screen dumps. Of course, you may collect quite a bit of garbage in this file as well (like line numbers), so some cleanup on the PC end is usually necessary. But after you do that, you'll have an ASCII file full of rows and columns of numbers that you can import into 1-2-3 and start getting some work done.

Because of the tedium of saving each screen and the cleanup work involved, this is not the optimum form of downloading.

The second approach to file transfer, which is both ingenious and kludgy, is generally limited to the two primary operating systems on an IBM mainframe, TSO (Time Sharing Option) and CMS (Conversational Monitor System). Here's how it works in TSO:

Available on the TSO command level at the "ready" prompt is an old line editor called EDIT. PC users familiar with ED-LIN would recognize the functions of many of the EDIT commands such as LIST and INSERT a line. (On the other hand, many recently trained 3278 users have been schooled solely in the ISPF/PDF (Interactive System Productivity Facility/Program Development Facility) environment and may not even know about EDIT.)

Generally, you would run the download program on the PC with the emulation program resident in memory. The download program requires the TSO dataset name and the PC filename and then simu-

lates 3278 keyboard strokes that load the TSO dataset into EDIT and list it on the screen. As the mainframe lists the lines, the download software captures them and saves them to the PC file.

### EDITOR'S CHOICE

*IRMA is to 3278 emulation what the Hayes Smartmodem is to modems: it's the one everyone else tries to imitate. Other manufacturers' software often supports the IRMA board as well. The IRMA board was the first 3278 emulation product for the PC, and DCA has used this early lead to develop a wide range of associated products. Although the IRMA emulation program is nothing fancy, it is simple to install and use. The only real deficiency in the package is the EDIT-based file-transfer program. Honorable mention goes to the BlueLynx 3270 Advanced Coax from Techland Systems, which has some interesting features available from the main menu, to the AST-3270/Coax EDIT-based file transfer software, and to Forte's implementation of 32-line displays and graphics in its Fortegraph upgrade of the Forte PJ.*

The uploading facility works similarly, except that the software mimics the EDIT method of creating a new TSO dataset, goes into line insert mode, and then uses the PC file to simulate keystrokes that type in all the lines of the file, finally terminating with the EDIT commands SAVE and END. Different download and upload programs that come with an emulation package may use XEDIT, which is a full-screen editor usually available on CMS.

The nice thing about this EDIT and XEDIT method of file transfer is that you can download data from the mainframe to your PC without actually informing the mainframe people (who sometimes get unnecessarily nervous about such things). From the mainframe side, it just appears as if someone is listing or typing in a dataset. The main problems with this type of file

transfer, however, are that it's slow and includes no real error-checking.

The third method of file transfer requires dedicated software on the mainframe host. Because the mainframe and the emulation software will be working together in transferring the file, this method is much faster than the screen-dump or EDIT-simulation methods. Depending on the package, this host software can be anything from a 20-line CLIST to a mainframe program that comes on magnetic tapes.

If you will be doing a lot of uploading and downloading, a fast file-transfer program is obviously the way to go. Unlike the other two methods, this one requires a spirit of cooperation. Your corporation's PC coordinators and mainframe people will have to sit down and work it out.

**PC LABS CHALLENGE** Testing 3278 emulation boards is easy. All you need is a PC with a disk drive or two, a monochrome or color adapter and display, and a coaxial cable. And, of course, you need a mainframe computer on the other end of the cable.

While the PC Magazine Labs are well-equipped for testing PCs, peripherals, and software, a mainframe is not part of our usual testing equipment. Fortunately, the Management Information Systems department of Ziff-Davis Publishing Company came to our rescue and graciously gave us access to its system as well as professional assistance in developing the testing procedure.

The Ziff-Davis mainframe is an IBM 4341 computer, running through three 3274 controllers connected using SNA protocol with nearly 100 3278 terminals located throughout the One Park Avenue building in New York City. The Ziff-Davis system includes CICS (Customer Information Control System, an operating system), MVS/TSO (Multiple Virtual System/Time Sharing Option, also an operating system), and ISPF/PDF.

ISPF/PDF is a menu-driven system that replaces the normal TSO command line. Under ISPF you can allocate, create, copy, move, rename, and delete datasets, browse them and edit them, compile programs, and even (for old-time 3278 users who get frustrated with menus) enter commands as you would on the TSO command



## ■ 3278 EMULATORS

level. ISPF includes an extensive on-line tutorial.

ISPF is a very popular environment for 3278 users, so our testing of the 3278 emulation boards generally involved maneuvering through ISPF and performing several common functions.

**UNOPENED WINDOWS** Several of the emulation packages allow you to use windows for multiple 3278 sessions. Since this function requires a setup on the mainframe end that the Ziff-Davis machine did not accommodate—specifically, a configuration for a 3290 Distributed Function Terminal—we were unable to test this facility.

If the emulation package included EDIT-based file-transfer programs, we also tested the TSO versions of this software. Because of the great variations in TSO response time, something that cannot be controlled on the PC end, we did not attempt to develop benchmark tests. The faster methods of file transfer usually require some systems work on the mainframe side; installing these programs was generally beyond the scope of this testing.

A gap in our coverage of 3278/9 emulation boards is the IBM 3278/9 Emulation Adapter, which IBM was not able to send to us in time for this review. IBM's board is, however, included in the summary-of-features table at the end of the review section for comparison purposes.

**CUSTOM TAILORING** Although I've been stressing some of the benefits of 3278 emulation on the PC, installing these boards in your office will, of course, raise all sorts of other problems. A whole range of issues from security (as when clever PC users put their log-on IDs and passwords in unprotected ProKey macros) to the data integrity of file transfers must be considered.

The reviews that follow should give you a good idea of the great variety in the design of 3278 emulation products. Just as every mainframe installation is different and every mainframe user environment is different, the right package (or packages) for your office will be different from the right ones for other offices. There is no one right way to do this and, consequently, no clear-cut winner among the competitors (see Editor's Choice).

## IRMA

For sheer ease of installation, nothing beats the Digital Communications Associates' classic IRMA board. The board has no DIP switches or jumpers; you just put it in a slot in your PC and attach the cable. The emulation program can be run directly without installation. I do not remember the last time I installed hardware or software as simply as this. (Later on, you may want to try out the configuration program, but you certainly don't need it to get going.) IRMA was the first 3278 emulation board; other manufacturers avoid using the IRMA I/O ports, and so this easy installation is a luxury few of them can imitate.

Because the IRMA emulation software was written back in the days when 256K was considered a lot of memory, the program is tiny. You can set it to remain resident in memory and then bounce back and forth between your 3278 session and other PC work by pressing the two Shift keys together. (Although memory residence is not required of emulation programs, this feature has been widely imitated by IRMA's competitors.) IRMA can save up to ten screen images in memory and recall them. A feature that is unique to IRMA is its ability to eke out a 26th line on the color/graphics display so that it can draw a line above the 3278 status symbols. A Color-mode key allows four different colors for distinguishing high and low intensity and

protected and unprotected fields.

If you specify a filename parameter when you load the emulation program, the file collects accumulated screen dumps that you trigger with Ctrl-PrtSc. (For instance, you can do primitive file downloading from the ISPF Browse facility with this technique if you later clean up the resulting file with a PC text editor.) One restriction on this procedure is due to DOS's "nonreentrant" nature: you can't make the program resident if at the same time you want to dump screens to a disk file. However, you can load both a resident and nonresident version of the program if you



## FACT FILE

### IRMA

Digital Communications Associates Inc.  
1000 Alderman Dr.  
Alpharetta, GA 30201  
(404) 442-4000

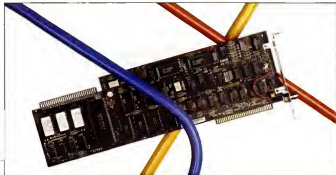
List Price: \$1,195

Requires: 64K RAM (256K for fast file transfers), DOS 1.1 or later (2.0 or later for fast file transfers).

**In Short:** The earliest entry in this category, IRMA is also the easiest to install. Some of its most useful features, such as saving screen images in memory and toggling between 3278 emulation and PC operations, are widely imitated by competing products. Its crude EDIT-based file-transfer software is its one defect.

CIRCLE 1 ON READER SERVICE CARD

*The first 3278 emulation board on the market, DCA's IRMA is a full-size card that is utterly simple to install. There are no DIP switches or jumpers to set.*



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## ■ 3278 EMULATORS

want the best of both worlds.

The *IRMAlink* software included with the IRMA board contains two sets of file-transfer programs. The first set, which uses TSO EDIT and CMS XEDIT, is fairly crude and slow but simple to get going. The most you'll have to do on the host side is change your log-on profile. The programs will prompt in the absence of command-line parameters (so that you can run them interactively or from a batch file), but they do not adequately interpret host error messages.

A second set of programs that permit high-speed VM/CMS and MVS/TSO file transfer are also included. They use VTAM (virtual telecommunications access method) and require extra software

Although the EDIT-based file transfer software could use an overhaul, IRMA remains one of the best and easiest approaches to 3278 emulation.

### PCOX/STANDARD AND PCOX/PLUS COAXIAL INTERFACES

CXI's half-length PCOX/Standard Coaxial Interface and PCOX/Plus Coaxial Interface boards are real wonders to look at: just 30 chips with a big chunk of 144-pin LSI (large-scale integration) chip stuck right in the middle. The only difference between the Standard and Plus versions is in the software. With the PCOX/Plus, you get file-transfer software and a windowing-emulation program.

The emulation software supplied with the PCOX/Standard package is an 18K-byte program that can be loaded in transient or resident mode. In transient mode, you can supply a filename for concatenated screen dumps. However, unlike with the IRMA software, once you load the program in resident mode, you cannot go back to DOS and load it again in transient mode if you later decide you want screen dumps.

You'll have to reboot, which fortunately does not disconnect your 3278 session.

The microcode used in the LSI chip on the board is uploaded from the disk by the emulation program. Alternatively, you can make the board IRMA compatible simply by running a supplied program with a different load file. Sure enough, after doing this I was able to use the CXI board with the IRMA emulation program. The screen update appeared a little more jerky with the CXI and IRMA combo than when the IRMA software uses the IRMA board or when the CXI program uses the normally configured CXI board, but it did work.

Aside from the screen-dump facility, the PCOX/Standard package includes no other file-transfer programs. The PCOX/Plus package includes the same board and disk as the PCOX/Standard and adds two more disks: one contains some file-transfer programs, and the other holds a windowing-emulation program.

The PCOX/Plus file transfers come in two sets: basic and advanced, both in TSO and CMS versions. For TSO, the basic file transfers require that two CLISTS, the TSO equivalent of a DOS batch file (one for uploading and one for downloading, each about 20 lines long) be created on the host side. The transfer program includes a menu option to boot load these files into an

## ■ A feature unique to IRMA is its ability to eke out a 26th line on the color/graphics display.

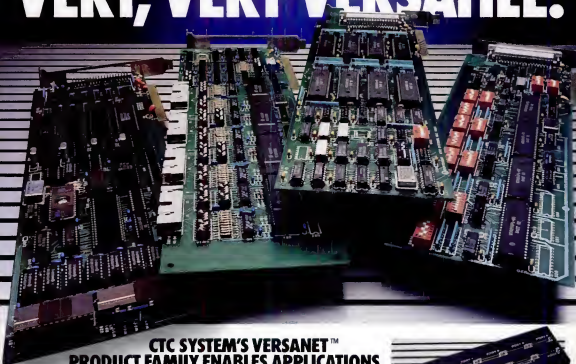
(available from DCA on magnetic tape for \$125) to be loaded on the host side. Although PC Magazine Labs did not have the opportunity to test these file-transfer programs, the diagrams in the manual show them to be menu-driven, with slicker user interfaces than those of the EDIT-based programs. Other file-transfer software for IRMA (as well as a larger keyboard made for 3278 emulation) is also available from the people at DCA.

The IRMA package includes keyboard stick-ons and a keyboard template. The reverse side of the template has a key to symbols on the 3278 status line. The manual is attractive and spiral-bound but unfortunately has no index. About half of the manual is devoted to technical reference and BASICA subroutines for getting at the screen buffer from external applications. And if that's not enough, the package includes the complete emulation program assembly language source code, profusely and wittily annotated. If you're brave enough, you can modify the thing and add functions to it.

*CXI's PCOX/Standard and PCOX/Plus package the same half-size board with different software. The big black chunk (bottom left) is a 144-pin large-scale-integration chip.*



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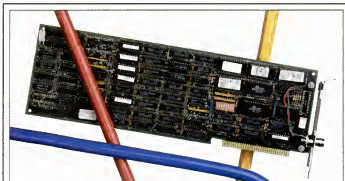
## ■ 3278 EMULATORS

ISPF EDIT screen. After that's done, you can start the transfers.

Although initially I was confused about which files had to be boot loaded and subsequently specified when doing the file transfer (I didn't realize that XU meant upload and XD meant download), this method of file transfer turned out to be very efficient. A 3278 user can do it without help (or permission) from the mainframe people, yet it transfers a file about five times as fast as IRMA's EDIT-based program. The advanced file-transfer software requires help from your mainframe systems people to install.

The PCOX/Plus package also includes a giant windowing-emulation program that takes up about 230K and gives you a 3278 session in one window, DOS in another, and two notepads. You can move the windows, size them, give them different background colors, zoom them to full screen, and jump between them. The complex keystrokes required to do anything with the windows make this windowing program less useful than it ought to be.

To use the DOS window, you have to zoom it to full screen, even if you're running a "well-behaved" program (in windowing lingo). You can transfer screen images from DOS or the 3278 session to a notepad, but it's mostly just for reference. When I tried to save a notepad to a PC file, I found it saved as EBCDIC; the letters be-



*The BlueLynx 3270 Advanced Coax takes advantage of DOS's SET command to let you save new DIP switch settings without running an installation program.*

came foreign-language characters, the numbers became punctuation, and I became confused.

I suspect that you'll find yourself using the smaller emulation program if only to save some memory for other applications. However, the basic file-transfer programs that come with the Plus version are well worth the extra cost if your data processing department doesn't want to be bothered with installing special host software.

## BLUELYNX 3270 ADVANCED COAX

The BlueLynx 3270 Advanced Coax software brings together an emulation program, an environment editor, a keyboard-map editor, a user-profile editor, a macro editor, a template editor, and file-transfer functions all in one menu-driven program. Other emulation packages generally have separate emulation, configuration, and file-transfer programs, but I like BlueLynx's approach better. It meant I didn't have to search around the subdirectory for the right file to use. It also means you'll be more inclined to experiment with some of the software's interesting features.

For instance, if you're generally a PC user and not a 3278 user, you will go berserk when you realize that the BlueLynx default keyboard maps the PC Enter key as the 3278 New-line key and the PC End key

as the 3278 Enter key. But you needn't fret for long because you can switch to one of the two alternative keyboards from the environment editor that's available from the main menu. (Of course, after you do so, the supplied keyboard template will not be correct.) While you're busy fixing the keyboard setup, you can also switch to a four-color screen, which uses different colors for protected and unprotected fields and for low and high intensity.

Although the default keyboard riled me during my initial exploration of this emulation program, I eventually found much to admire in the BlueLynx package. Techland Systems has taken a fresh and innovative approach that has some clear value in corporate environments.



### FACT FILE

#### PCOX/Standard Coaxial Interface PCOX/Plus Coaxial Interface CXI Inc.

3606 W. Bayshore Rd.  
Palo Alto, CA 94303  
(800) 221-6402

List Price: PCOX/Standard, \$895; PCOX/Plus, \$1,145; software upgrade from Standard to Plus, \$195

Requires: PCOX/Standard, 96K RAM; PCOX/Plus, 384K RAM. File transfers require 256K RAM. DOS 2.0 or later.

In Short: Both versions of the PCOX board are half-length. The Plus version includes some good file-transfer software, but the boards on the whole are not as easy to work with as some others.

CIRCLE 679 ON READER SERVICE CARD



### FACT FILE

#### BlueLynx 3270 Advanced Coax

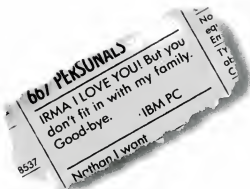
Techland Systems Inc.  
25 Waterside Plaza  
New York, NY 10010  
(212) 684-7788

List Price: \$995 (\$1,295 with 122-key keyboard)

Requires: 256K RAM, DOS 2.0 or later.

In Short: BlueLynx gives you a comprehensive assortment of software, including an excellent screen-capture facility. Its default keyboard is difficult to master, but Techland offers two alternatives.

CIRCLE 678 ON READER SERVICE CARD



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CIRCLE 320 ON READER SERVICE CARD

## ■ 3278 EMULATORS

The macro editor is very powerful, including variables, arithmetic and logical operators, pauses, if-then-else constructs, and checks of screen contents. You can set it up for unattended sessions and file transfers. In the user-profile editor, you can specify different environments, templates, and macros for different users, and then password-protect some of them if you wish. For instance, you could restrict some users to download-only privileges for file transfers.

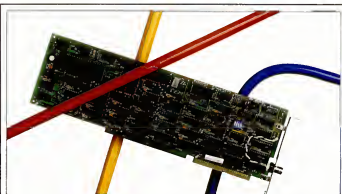
The BlueLynx package includes file-transfer provisions for CICS as well as the usual TSO and CMS, but it also requires special host software, which the manual recommends you have a systems programmer install.

While I couldn't test the file-transfer software, BlueLynx's screen capture facility has some exceptionally appealing features that make it more valuable than the screen dumps available with other emulation software. You can use the template editor to define fields on the screen and then save these fields as a DIF file, in comma-delimited format or in the .WKS file format used by I-2-3.

If your data processing department routinely produces a report or other collection of data in a constant format, you can set up one or more templates to block out the number fields. You then browse the main-frame output file in ISPF and dump the results to a .WKS file ready to be read into I-2-3. Nice.

Unfortunately, when you do the .WKS screen capture, you must specify either a row or column output format. The template fields are simply numbered from 1 through whatever without regard to row or column, and so the .WKS file ends up with all the numbers in either Row A or Column 1. You'll probably be able to set up a I-2-3 macro to fix these up, but it's a nuisance that you'll wish the BlueLynx program could have fixed.

As on all the other emulation boards tested here (except the IRMA), the I/O address and interrupt level can be changed by DIP switches. Most programs require that you run an installation program if you change the DIP switches, but with the BlueLynx, you use the DOS SET command to save the settings in your DOS environment. This is exactly the type of thing



*The washer on the Persyst Coax/3270's coaxial cable jack is too wide for the rear-panel opening of an XT, making pliers necessary for installation.*

the DOS environment is supposed to be doing and I'm glad to see Techland Systems taking advantage of it.

The manual is a problem. It is nicely printed and explains the menu and submenu selections well, but it's very difficult to use for reference because of a lack of page headings. You'll get lost just flipping through the pages—and to make things worse, it has no index.

### PERSYST COAX/3270

The E3270 emulation program included with the Persyst Coax/3270 board is short (about 32K bytes) and in many ways resembles IRMA's software. As with IRMA's emulation software, hitting both Shift keys takes you back to DOS. The Persyst software, however, becomes memory-resident automatically if you don't specify a filename parameter for screen dumps, so that you can double-shift back from DOS to the emulator.

When first loading the E3270 program, you can specify a filename for screen dumps. Ctrl-F1 saves a screen to the disk file; Ctrl-F2 appends the screen to the file. Because of the nonreentrant nature of DOS, using the screen dump facility prevents the program from becoming resident.

The default keyboard mapping relies mainly on the Alt key to add special 3278

keys. The mapping is somewhat unusual. The tasks of PF1 through PF10 are assigned to the Alt key in combination with the ten numeric keys at the top of the keyboard, which is fairly standard. However, while most emulation software assigns PF11 to Alt-Dash and PF12 to Alt-Equal sign, Persyst continues PF11 through PF20 as Alt-Q through Alt-P and PF21 through PF24 as Alt-A through Alt-F.

The emulation software includes foreign-language keyboards; you can construct your own if the Persyst's defaults annoy you. After you're done, turn over the supplied keyboard template and write your



#### FACT FILE

##### Persyst Coax/3270

Emules Corp.  
3545 Harbor Blvd.  
Costa Mesa, CA 92626  
(714) 662-5600

List Price: \$1,095

Requires: 64K RAM (128K for DOS 2.0 or later), DOS 1.1 or later. For file transfer, 192K RAM, DOS 2.0 or later.

**In Short:** Upgraded file-transfer software has dramatically improved the Persyst board. Its emulation program is similar to IRMA's. The board itself is somewhat difficult to install, and its unusual keyboard mapping may be hard to learn but is easily changed.

CIRCLE 872 ON READER SERVICE CARD



definitions in the blank keyboard on the reverse. Emulex is the only company that supplied a blank keyboard template.

One thing you can't change is the effect of the CapsLock key. When you're using the emulation program, CapsLock shifts the top row of numbers as well as the letter keys. For a PC user, this might be a little startling, but it's consistent with the 3278 system.

The Persyst's file-transfer software

## ■ Persyst's file-transfer software has recently undergone some welcome revisions.

from CDI Systems Inc. has recently undergone some welcome revisions, including removal of copy protection. The EDIT-based programs for TSO and CMS use a full-screen menu and give a status report during file transfers that tells you when they are changing the EDIT profile, editing the file, listing the lines, and restoring the profile. Any error messages from EDIT that prevent the transfer are reported through the transfer program. Once it gets going, the actual file transfer is somewhat faster than with IRMA's EDIT-based programs.

The file-transfer software also includes programs that require dedicated host software. However, the host software is the same as that used for IBM's 3270/PC, and so if people in your company are using these machines, the proper host software may already be installed.

I had some problems with the Persyst Coax/3270 board itself. The washer on the coaxial cable jack was too wide for the rear-panel opening of the PC-XT with which I tested the board, and I couldn't attach the coax connector without a pair of pliers.

Both Emulex and CDI have been making recent changes to the software for the Persyst Coax/3270 package; if this review is more positive than other reviews of the product you may read, these upgrades are

the reason. Now that the package is about average in comparison with the competition, I hope they continue to improve the software until it's even better.

## AST-3270 COAX

Sometimes when I review several similar products, I get the impression that I'm really reviewing the same product in different boxes. The AST-3270/Coax windowing-emulation software seemed so similar to CXI's PCOX/Plus software that I had to take a closer look with DEBUG. Sure enough, the AST program has a CXI copyright along with an Amber Systems copyright. The programs have the same version number (2.2.A), but the AST version has some different text headings, so that the menus say AST instead of CXI.

The AST-3270/Coax board is a half-size card that is not exactly the same as the CXI card. It gets the chip count down to a paltry 16 and includes a 144-pin LSI chip with "CXI" hidden under the AST label.

As with CXI's PCOX/Plus, you can use one of two very different programs. The larger program takes up about 230K bytes when resident and gives you four windows for a 3278 mainframe host, DOS, and two notepads. The smaller program is only 18K long. You lose the win-

dows and the notepads, but you can still flip back and forth between the mainframe session and DOS.

The manual contains virtually no information on how to use the two notepad windows included in the large windowing program. I suspect they can function as simple editors because I could type in them, but I didn't know how to do actual editing in them. Since this windowing program does not include a facility to dump a screen to a disk file (which is often a handy quick-and-dirty download), I attempted to use



### FACT FILE

**AST-3270/Coax**  
AST Research Inc.  
2121 Alton Ave.  
Irvine, CA 92714  
(714) 863-1333  
List Price: \$1,145

**Requires:** 128K RAM (nonwindowed) or 256K RAM (windowed), DOS 2.0 or later.  
**In Short:** The AST-3270/Coax board is extremely similar to the half-size CXI PCOX/Plus, and its emulation software even carries the CXI copyright. Its excellent file-transfer program, however, distinguishes it from the CXI package as well as from other competitors.

CIRCLE 672 ON READER SERVICE CARD

*The AST-3270/Coax is almost identical to CXI's PCOX boards, but the chip counts differ: The AST carries only 16 chips to the PCOX's 30.*



## ■ 3278 EMULATORS

the notepads for that.

Sure enough, you can cut out something from another window (probably your 3278 session window) to save in a notepad. This process requires a bunch of keystrokes like F3, Shift-F8, and Alt-Shift-1. (I couldn't imagine ever becoming fully familiar with these keyboard maneuvers.) You can also save the contents of the notepad to a disk file, so that you can restore it back to the screen the next time you get on. But since the notepad stores in EBCDIC instead of ASCII, it's not of much use otherwise.

The AST-3270/Coax includes separate file-transfer programs that are *not* the same as those included with CXI's PCOX/Plus. Instead, they carry the copyrights of the Mackenson Corp. The TSO version uses

The manual is poor, with no index and very little user information. A large chunk is devoted to the applications program interface that can allow programmers direct access to the emulation program.

Although the hardware and software elements of this 3270 emulation package are virtually the same as those of CXI's PCOX/Plus, the AST-3270/Coax benefits greatly from an excellent TSO EDIT-based file transfer.

### FORTE PJ

The Forte PJ emulation board and software are a special case. For emulating a 24-line 3278 display, you could do better for \$1,195. The package includes no file-transfer software (it's available separately as TSO-ForteNet and CMS-ForteNet at extra cost) and the screen-dump program is rather clumsy. For a concatenated screen dump, for instance, you have to type Esc, A (for Append), the filename, and Enter. This is a few keystrokes too many for such a job, particularly when compared with IRMA's Ctrl-PrtSc combination for the same function.

You can install the emulation program as resident in memory, although doing so restricts its disk-access function. As with IRMA, however, you can load a second emulation program for both resident and nonresident functions.

The manual is short but very good. I particularly appreciated the page showing the various possible I/O addresses for set-

ting the board with possible conflicts between those ports and other common peripherals. This simple table could save a user with an unusual configuration a lot of headaches. Moreover, most of the other boards (with the exception of IRMA) allow a choice only between ports 2EE and 3EE, which would produce a conflict if you have two COM ports on your PC. Forte PJ allows a more extensive selection of addresses.

But the real value of the Forte PJ package becomes apparent only when viewed as the first step to a larger configuration. Some of the other 3278 emulation products reviewed in this article can emulate a 3278 or 3279 display larger than 24 lines by 80 columns by scrolling or windowing. None of them can display graphics. Forte

## ■ The AST-3270/Coax file-transfer program shows off its intelligence mainly through better interpretation of EDIT error messages.

EDIT and requires that you be at the READY prompt in your host window.

The AST-3270/Coax TSO EDIT-based file-transfer program was simply the best I tried out during this testing. It is definitely "smarter" than the other TSO EDIT transfer programs, and it shows off its intelligence mainly through better interpretation of EDIT error messages. For instance, the AST download program was able to tell me that the TSO dataset I specified for a download was partitioned and it needed a member name. The IRMA EDIT-assisted download program just said the file couldn't be found, and exited.

The CMS file-transfer program uses XEDIT and probably works similarly, but PC Magazine Labs did not have the opportunity to test it out. The AST-3270/Coax package is also compatible with IRMA BASIC subroutines.

## PC MAGAZINE FACT FILE

### Forte PJ

Forte Communications  
2205 Fortune Dr.  
San Jose, CA 95131  
(408) 945-9111

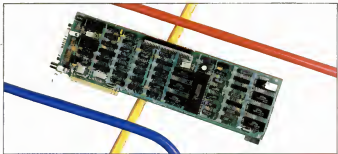
List Price: \$1,195

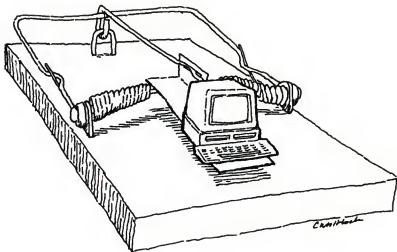
Requires: 64K RAM with DOS 1.1; 128K RAM with DOS 2.0 or later.

In Short: For emulation of normal 24-line 3278s, the Forte PJ's performance is fair. But when you upgrade it by adding another card and software package, it really shines at emulating the 3279 Model S3G colorgraphics terminal with a true 32-line display.

CIRCLE 471 ON READER SERVICE CARD

*Forte lets you expand your PC into a colorgraphics terminal with a 32-line display by attaching a Fortegraph board to the basic Forte PJ board, as shown.*





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Tulsa, Oklahoma 74146  
(918) 252-5550

## ■ 3278 EMULATORS

does both with real style, although at a higher price.

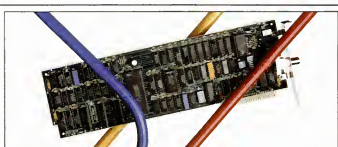
With a \$995 upgrade to the Forte PJ card and software (or for \$1,995 by itself), you get Fortegraph, which emulates the 3279 Model S3G color/graphics terminal with a real 32-line display. This emulation would normally be impossible with the IBM color/graphics adapter, but Forte has found a way around the restriction. The Fortegraph package includes a second board that attaches to the regular board without taking an additional slot. You plug a supplied cable from your video adapter to this board; the regular display cable goes from the additional Fortegraph board to your monitor. When you use the regular Forte PJ software or use the PC for other programs, the video signal just passes through and you won't know the difference. But when you use the Fortegraph software, the board takes over your monitor and, using interlacing, displays 32 lines with color and graphics.

Since the normal IBM Color/Graphics Display is not a high-persistence monitor, this interlaced display will be flickery. However, the Fortegraph manual suggests some other color monitors that handle interlacing better.

Unfortunately, the Ziff-Davis mainframe expected a plain old 3278-2 attached at the end of our coaxial cable, so the Fortegraph software left an 8-line gap between the normal 24 lines and the status line. However, it did use the real 3278/9 symbols down on the status line, and I got a kick out of seeing that. Obviously, the Ziff-Davis system was not the right one to test this board on, but we were surprised the configuration worked at all.

On a mainframe system configured for a 3279-S3G, however, the screen-dump facility suddenly takes on new meaning because you can dump color/graphics images to PC disk files. Also included is a program to view these graphics images outside the emulation program on the PC screen.

If you're only looking for an emulation board and software for normal 24-line 3278s, Forte PJ is an adequate but hardly exemplary choice. For 32-line displays and color graphics, however, the Fortegraph board and software are in a class by themselves.



*IDEAssociates gives you the option of configuring the IDEComm 3278 to make it compatible with software written for DCA's IRMA board.*

## IDEACOMM 3278

IDEAssociates has taken an unusual approach to 3278 emulation software. In this age of menus and easy user interfaces, the last thing I expected to see pop up on the screen was an old-fashioned command line. But there it was, a little introductory message and half of a DOS prompt—no default drive, just an angle bracket.

The commands you can enter on the command line are GO (which puts you into emulation mode), DIR (which may take a drive letter argument but which displays filenames only), TYPE (which displays a file to the screen), PRINT (which can assign either a file or local printer for dumping screens), SEND (which sends a screen to the host), CAPTURE (which saves a 3278 screen), HELP (which is like the TYPE command except it displays a short

help file), and EXIT (which brings you back to DOS).

You can jump from emulation mode to the command line by pressing Esc. You can also make the emulation program resident in memory using the two Shift keys. But while most emulation programs prohibit disk accesses from the emulator if the program has been made resident, the IDEComm 3278 does not. IDEAssociates is getting around the DOS reentrance problem in some way. I wasn't entirely comfortable with this method, but I didn't encounter any problems.

The SEND command is interesting. To use it you would first prepare an ASCII file on the PC. Entering the SEND command followed by the filenames you want to transfer puts the program into 3278 emulation mode and treats the file as a series of keystrokes that the software enters into nonprotected fields. Tabs in the file are treated like the 3278 Tab key; they skip the cursor from field to field. You could use SEND in conjunction with ISPF EDIT for uploading files to the host. This process will take some experimentation and, of course, many of the 3278 keystrokes cannot be mimicked in the SEND file, but you may find this a useful addition to normal uploading capabilities.

Different keyboard configurations used in 3278 emulation programs are suitable for different types of users; IDEComm's default keyboard would be excellent for a PC user who has no experience working on a real 3278 terminal. The 3278 PF keys are assigned to the PC function keys. The special 3278 functions (assigned to keys in the



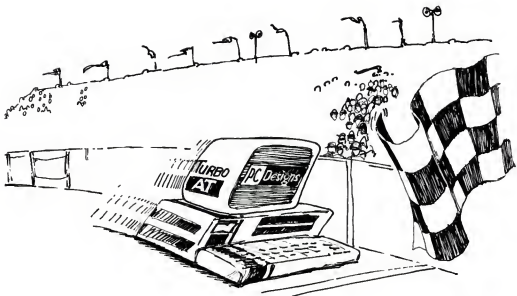
## FACT FILE

**IDEComm 3278**  
IDEAssociates Inc.  
35 Dunham Rd.  
Billerica, MA 01821  
(617) 663-6878  
List Price: \$995

**Requires:** 128K RAM, DOS 2.0 or later.

**In Short:** Several software features distinguish this board from its competitors, particularly its command-line interface and its ability to get around DOS's nonreentrant nature.

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## ■ 3278 EMULATORS

same location on the 3278 as the PC function keys) are assigned to Ctrl-key combinations. Any *WordStar* user would feel right at home.

Of course, a veteran 3278 user would choke on this keyboard mapping; IDEAsociates has included a provision to allow these users to define their own.

Aside from the screen CAPTURE and SEND commands, IDEAcmm 3278 in-

■ Once I got over the shock of seeing the command line, the IDEAcmm 3278 software worked fine.

cludes file-transfer software that uses the mainframe EDIT (for TSO) and XEDIT (for VM/CMS) commands. The IDEAcmm XFER program must be run from the DOS command level after you're at the applicable 3278 prompt (for example, the READY prompt for TSO) and have made the program resident.

The file-transfer program needs some work. It keeps a lot when you're working with it. For TSO it can only work with datasets that have DATA extensions, and it cannot work with partitioned datasets. This baffled me, but when I toggled back to the 3278 session, I found the transfer program was appending a DATA extension onto the TSO dataset that I had entered into the transfer program menu.

The IDEAcmm package includes an option to configure the board for IRMA compatibility so that you can use software written for the IRMA board. An appendix in the manual discusses BASIC subroutines for an applications program interface to the emulation program.

Once I got over the shock of seeing the command line, the IDEAcmm 3278 software worked fine. Its ability to conquer the DOS reentrance problem and the possible usefulness of its SEND command make this package stand slightly apart from the competition.

## 3-N-1 3270 COAX ADAPTER

Attachmate's 3-N-1 3270-PC Emulation Program uses windowing to display a 3278 session (or more than one if your mainframe is configured for it), two notepads, and DOS. The features sound familiar, but this program is not the same as the software included with the CX1 and AST packages. It takes up far less memory and allows you to perform operations in the DOS window without enlarging it to take up the full screen, something the CX1 and AST packages prohibit. (Of course, for applications that write directly to the screen, you'll want to expand the window anyway.) The 3-N-1 program will also save a notepad to a PC disk file in ASCII rather than EBCDIC.

The keyboard mapping shows some knowledge of common ISPF PF key definitions. In ISPF, PF7 is normally defined as Page Up and PF8 as Page Down (although an ISPF 3278 user can change these definitions). You might imagine that many emulation programs duplicate PF7 and PF8 on the PC PgUp and PgDn keys. You would be wrong for most but right for the 3-N-1 program.

Window maneuvers and other non-3278 functions in the 3-N-1 program generally use the Alt-Ctrl key combination. Alt-Ctrl-Spacebar jumps between windows, and Alt-Ctrl-CapsLock enlarges a window, for instance. Alt-Ctrl in combi-

nation with the numbers in the keyboard's top row displays the windows on screen in different configurations that you can set. Beyond these simple examples, the Alt-Ctrl key combinations can get pretty complex, sometimes requiring you to type two letters.

In most 3278 emulation programs, EDIT-based file transfers are initiated from the DOS command level so you can't see what is going on between the transfer program and the TSO EDIT command. The 3-N-1 program's, however, are initiated by Ctrl-Alt-FT (for "file transfer"), which displays a pop-up menu. You then specify TSO or CMS, whether you want to upload or download, the PC filename, and the TSO (or CMS) filename. You can then watch how the file transfer proceeds (or



## FACT FILE

### 3-N-1 3270 Coax Adapter and 3270-PC

#### Emulation Program

Attachmate Corp.

3241 118th St., SE

Bellevue, WA 98005

(206) 644-4010

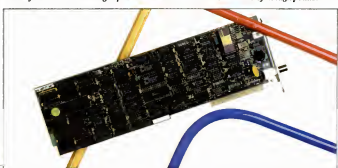
List Price: \$1,195

Requires: 128K RAM, DOS 2.0 or later.

In Short: The 3-N-1 package's keyboard mapping, IRMA emulation, and file-transfer capabilities are admirable, but Attachmate bit off more than it could chew when it attempted to put DOS in an on-screen window.

CIRCLE 888 ON READER SERVICE CARD

*Attachmate's 3-N-1 3270 Coax Adapter is a straightforward board packaged with some erratic software. Its windowing capabilities and IRMA emulation are two of its high points.*





## 3278 Terminal Emulation Boards and Software: Summary of Features

Manufacturer Product	Terminal emulation	Keyboard mapping			File transfer				Other	3278 status line	Windowing software	Resident program size†	Diagnostics program	IBM 3278/79 emulation	Adapter compatibility	IRMA compatibility
		Alternatives	International	User-defined	Screen dumps	Using TSO EDIT	Using CMS XEDIT	Host-supported								
IBM Corp. IBM 3278/79 Emulation Adapter*	3278-2, 3279-2a, 52a	■			■	■	■	■	VSE/SP SXX-VSE	▲		63K	■	N/A	■	■
DCA IRMA	3278-2, 3, 4 3279			**	■	■	■	■		●		30K				■
CXI PCOX Standard	3278-2, 3, 4, 5† 3279-2A, 3A	■	■		■					▲		55K	■			■
CXI PCOX Plus	3278-2, 3, 4, 5† 3279-2A, 3A	■	■	■	■			■		●		55K	■			■
Techland Systems BlueLynx	3278-2, 3, 4 3279-2A, 2B, 3A, 3B	■		■	■	■	■	■	DIF	●		132K				■
Emulex Corp. Persyst Coax 3270	3278-2 3279S2A, 52B		■		■	■	■	■		●		33K				■
AST Research AST-3270 Coax	3278-2, 3, 4 3279-2A, 3A	■	■		■	■	■	■		▲		55K	■			■
Forte Communications Forte P.J.	3278-2, 3, 4, 5 3279-52A, 52B, 53B		■	■	■			extra		●		71K	■			■
IDEAssociates IDEAcomm 3270	3278-2 3279-52A, 52B		■	■						●		70K	■	■		■
Attachmate Corp. 3-N-1	3278/79-2, 3, 4, 5	■	■		■	■	■	■		●		75K	■	■	■	■

\*Not reviewed in this issue. †Requires special graphics boards. \*\*DCA will help to define a keyboard. ‡Resident program size: PCOX PLUS at 55K without windows; 233K with 2 notepad windows. AST-3270 Coax is 55K without windows; 239K with 2 notepad windows. 3-N-1 is 75K with one 3278 session and 2 notepad windows.

● = Symbols ▲ = Symbols or English ■ = Yes N/A = Not applicable

doesn't quite proceed) in the 3278 window. I found that with the 3-N-1 program, the PC file of the download had line numbers (unlike the result with most other EDIT-based file-transfer programs), and the upload routine insisted on adding a TEXT extension to the end of the TSO file. But at least you can see how it's messing up. Host-supported file-transfer software is also included.

The 3-N-1 file-transfer programs (and some other parts of the software) have an interesting method of telling you they need input. For instance, if you want to download and the PC file already exists, the PC's buzzer will sound—and will continue to sound until you press the right key to specify that you want to overwrite the file or abort the download. I've become accustomed to annoying little beeps here and there, but a continuous buzzer is simply in-

tolerable. A little use of this program and you may find yourself reaching inside your PC case with a pair of wire clippers.

Most emulation packages give you a choice between resident and transient emulation programs. Attachmate's 3-N-1 program cannot be loaded as a transient program and cannot be exited. Although you can, of course, jump to the DOS window, enlarge it to full screen, and pretend the emulation program isn't there at all, you may start to notice some programs functioning abnormally. For instance, the F2, F4, and F5 keys no longer work as editing keys in this mode. Pressing Ctrl-Break in EDLIN to get out of insert mode sometimes leaves an ASCII zero on the line.

Very simply, the 3-N-1 program is not handling the keyboard correctly. If you could exit the program, it wouldn't be so

bad, but the only way to exit is with Ctrl-Alt-Del.

There is much to admire in this package. It is the only one that can be configured for compatibility with either the IRMA board or the IBM 3278 emulation board. The 3-N-1 package also supports IBM's API (application program interface), so that PC applications and the mainframe host can communicate. However, to let DOS (and other programs) run in a window, the developers had to do some programming equivalent to sections of *TopView* and *Windows*. They aren't quite up to it.

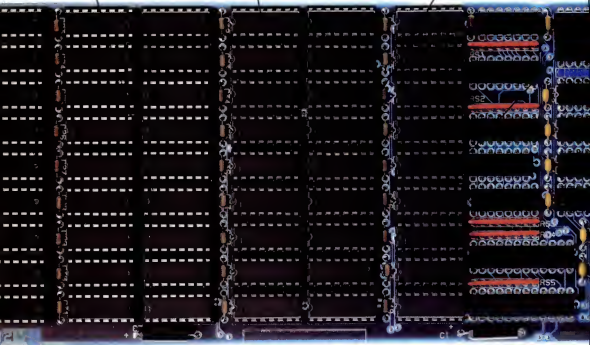
*Charles Petzold, a contributing editor of PC Magazine, slaved in front of a 3278 terminal doing PL/I programming for many years before finally achieving redemption through the IBM PC.*

# Diary of an

I traded my 16K machine and all those disks for Lotus® 1-2-3 and 256K. And immediately got the urge to merge. I started by merging regional statements in Maine. But before I could get to Iowa, I ran out of gas.

At 512K, I discovered what the coordinates IV169 looked like. I was so far out there it felt like I was walking on the moon. It didn't take long to find out 512K was nothing more than a walk around the block.

640K! Loads of space until I fell in love with integrated software and was back to cutting up files again. Sure, the other functions make my worksheet more persuasive, but I'm back to slugging in and out disks. Shades of 16K.



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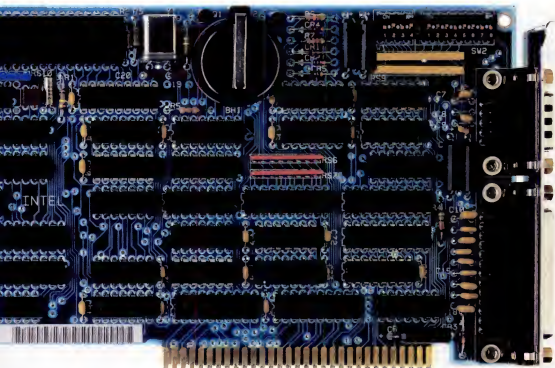
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CIRCLE 216 ON READER SERVICE CARD

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# SPREADSHEET

# HONEST

*These spreadsheet troubleshooters specialize in tracking down those nearly-impossible-to-find single-cell errors that can turn your hard work into mush.*

**S**preadsheets are marvelous. So marvelous that corporate America can't get along without them. But spreadsheets can also be treacherous. A single error in a single cell can trash a beautiful model. And in big, convoluted models, mistakes can be nearly impossible to track down. Nobody likes to talk about it, but there are some funky spreadsheets out there.

Surprisingly, the problem is bad enough to have spawned a brisk little market for programs that help you keep your spreadsheets honest. They're not smart

enough to fix things on their own, but they all analyze your work and produce reports that make it easier to fix things yourself.

There are two basic kinds of spreadsheet analyzers. The first kind sniffs its way through a model and produces a report on such things as circular references, cell formats, and use of functions. It's a one-way process: Your model goes in one end and a report comes out the other. The other kind is interactive. It lets you poke around inside your model at your own pace, looking for trouble. You can use the analysis tools where and when you like.

## ■ SPREADSHEET UTILITIES

*DocuCalc* and *The Spreadsheet Auditor* are straight report generators of the first kind. They give you good information on what's in your spreadsheet, but they don't take you inside it. *The Cambridge Spreadsheet Analyst*, on the other hand, does more than print reports. It is an interactive program that gets into the guts of a spreadsheet and lets you trace faulty results right back to the culprit cell.

**DOCUCALC** *DocuCalc* is the lightweight of the three, and the easiest on your wallet, but if you've never seen a spreadsheet analyzer before, you'll think it's great. Like all the analyzers, it works with all versions of 1-2-3 and *Symphony* and runs on Lotus-style, two-line menus. It's so easy to use that you won't even notice that it doesn't have help screens.

Once you've loaded a worksheet, you can choose among seven types of reports. The most useful is probably the grid report, which prints worksheet formulas in rows and columns just as they are in your model (see Figure 1). Since formulas are often a lot longer than the results they put into a cell, *DocuCalc* gives you several ways to display them. You can set the column widths in the report wide enough to hold giant formulas, which means you get fewer columns per page. Or you can ask *DocuCalc* to "wrap" long formulas into narrow columns. A 40-character formula in a 10-character-wide column would wrap to four lines, and you'd get more columns per page but fewer rows.

You can tailor the grid report in many ways. You can include current cell values or just formulas. You can ask for cell formats or turn the coordinate grid off. And, as in all *DocuCalc* reports, you can analyze the whole model or just part of it and dump the report to screen, printer, or disk.

A different *DocuCalc* report prints worksheet contents one cell per line in row or column order. You can ask for a report on formulas only or on all cell contents. This cell-by-cell report is a handy way to compare formulas in a range of adjacent cells.

*DocuCalc*'s spreadsheet map gives you a bird's-eye view of your model. It represents each cell with a single letter: L for labels, V for Values, B for formatted but blank cells, and so on. You can cram a big

model into a small space and tell at a glance if cells don't fit in with the surrounding pattern.

The cross-reference report helps trace spreadsheet logic. For any range of cells, *DocuCalc* lists all cells with formulas that refer back to them. Another helpful report tells you which cells are part of a circular reference chain.

*DocuCalc* can also give you a table of range names, with all the cells they cover, and a final, catchall report on spreadsheet status. The status report lists such things as global formats, size of model, recalc details, and printer defaults, as well as data ranges, named graphs, and default graphs.

### PC EDITOR'S CHOICE

*The Cambridge Spreadsheet Analyst is vastly superior to both DocuCalc and The Spreadsheet Auditor and will leave you wondering how you ever spread a sheet without it. The program's ability to dip right into your spreadsheet at any time makes the analysis process smooth and intuitive. Serious 1-2-3 users will find its features—such as Scan, which zeros in on common but hard-to-spot logic errors—indispensable.*

Finally, you can run *DocuCalc* in batch mode by giving it instructions at the DOS command line. When you load the program, you just type in the name of the worksheet file(s) you want analyzed and a series of one-letter instructions that tell it which reports to print. The program will run by itself, just like a spreadsheet macro. If you have a set format for reports you use a lot, put the command line sequence in a batch file with replaceable parameters instead of filenames. When you want a report, type the batch command and the filename and let *DocuCalc* take over.

*DocuCalc* is fine as far as it goes, but it can take its time getting there. The screen refresh is a touch slow, and some of the reports poke along. The circular error check on a test spreadsheet took 4½ minutes, while *Auditor* took 30 seconds to perform the same task and *Analyst* whizzed through

in 15 seconds. You get a lot of analysis for your \$95, but a few more bucks buys you a lot more.

**THE SPREADSHEET AUDITOR** *The Spreadsheet Auditor* is a slicker, more costly *DocuCalc*, with some nice additional features. It operates much like *DocuCalc* and will work with *SuperCalc* as well as 1-2-3 and *Symphony*. *Auditor* has combined several reports into one but gives you the option of leaving parts out when you print to disk, printer, or screen.

Like *DocuCalc*, *Auditor* will give you a report of worksheet formulas in a variety of formats, with the added convenience that you can choose to let *Auditor* set the printout column to whatever width it needs to display long formulas.

*Auditor* can produce a single-character-per-cell spreadsheet map and list worksheet status, named ranges, graph options, and data ranges. It can also take instructions from the command line and run unattended in "express" mode. The only *DocuCalc* feature for which *Auditor* doesn't have an equivalent is a report that prints the contents of one cell per row, but it makes up for this with other goodies.

*Auditor*'s cross-reference report, which runs many times faster than *DocuCalc*'s, not only lists cells that refer to other cells but does the same for ranges. As an added bonus, it tells you which ranges are referenced by multiple-cell functions such as @sum, @avg, or @count.

A sideways printing utility will turn any text file on its side. This is a great help, not just for printing wide spreadsheets but for

### PC FACT FILE



**DocuCalc™**  
Micro Decision Systems  
P.O. Box 1392  
Pittsburgh, PA 15230  
(412) 854-4070  
List Price: \$95  
Requires: 192K RAM,  
one disk drive, DOS

**In Short:** *DocuCalc* generates seven different kinds of reports based on its analysis of your spreadsheets. It's useful, but compared with the competition it's slow and limited.

CIRCLE 790 IN READER SERVICE CARD

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## ■ SPREADSHEET UTILITIES

some of *Auditor's* own reports. However, because the utility has to run your printer in graphics mode, a print job takes a very long time.

*Auditor* has a macro analysis program, but it doesn't do very much. It prints out listings of the macros you specify and, if you ask for it, will indicate whether a macro branches to other macros or calls sub-routines. This isn't much more than you would get if you just printed that part of your spreadsheet.

On the whole, *Auditor's* reports are a little easier to read than *DocuCalc's*. The program runs much faster, and it has good help screens. If all you want is reports and a sideways print utility, it's worth the premium price. However, for the same price as *Auditor*, you can get the best of the lot: *The Cambridge Spreadsheet Analyst*.

### THE CAMBRIDGE SPREADSHEET

**ANALYST** In approach, *The Cambridge Spreadsheet Analyst* differs radically from the other two. It takes you inside your model, where you can move around at will, tracing logic and looking for errors. The program generates good reports if you need them, but you don't have to print out a thing if you don't want to. Unless your model is riddled with errors, you can probably catch them on the fly.

*Analyst* has four interactive analysis modes: Scan, Circ, Xref, and Probe. Generous help screens guide you through all your choices.

If you choose Xref, you get a list of all cells in your *Symphony* or *1-2-3* model that

	A	B	C	D	E	F	G	H	I	J	K
	10	9	9	9	9	9	9	9	9	9	9
1	Income statement for XYZ company										
2	Date 06/18/83, 1:11										
3	Revenue	4000	15000	32000	35000	40000	70000	10000	110000	120000	140000
4	Operating expense	10000	22000	31000	37000	45000	54000	60000	75000	81000	100000
5	Gross margin	(37-94)	(32-C4)	(32-34)	(32-E4)	(32-F4)	(32-G4)	(32-H4)	(32-I4)	(32-J4)	(32-K4)
6	Gross margin %	B3/(B4+B5)	B3/(C4+C5)	B3/(D4+D5)	B3/(E4+E5)	B3/(F4+F5)	B3/(G4+G5)	B3/(H4+H5)	B3/(I4+I5)	B3/(J4+J5)	B3/(K4+K5)
7	Taxes \$50k	+B9*5	+C9*5	+D9*5	+E9*5	+F9*5	+G9*5	+H9*5	+I9*5	+J9*5	+K9*5
8	Income after tax	(B4+B5)	(C4+C5)	(D4+D5)	(E4+E5)	(F4+F5)	(G4+G5)	(H4+H5)	(I4+I5)	(J4+J5)	(K4+K5)
9	Circle	+C15-C14	+D14								

Figure 1: A DocuCalc grid report prints spreadsheet formulas in rows and columns. Long formulas are wrapped to fit within columns. Note that cells B14 and C14 contain a circular reference. A similar report is available in *The Spreadsheet Auditor*.

refer to a given cell or use a given function. Figure 2 shows how the screen might look if you asked for references to E10. The top part of the screen lists them all. You use the cursor movement keys to highlight any of them, and the formula in that cell appears in the lower part of the screen.

If you want to see a cell in context, highlight its address and hit F10. You'll be right back inside your spreadsheet at that very address. Actually, what you see is only an image of the spreadsheet; you can't make changes to it while you're in *Analyst*. But you can cruise around all you like with the usual 1-2-3 movement commands to check formulas and formats. When you have finished looking at cells in context, just hit Escape and you're right back where you were in *Analyst*.

This ability to dip into the spreadsheet whenever you like is one of *Analyst's* great features. You can immediately check out any suspect cell in context rather than switch clumsily from report generator to spreadsheet and back again. This interactive approach is so obviously useful that any spreadsheet analyzer that doesn't have it doesn't make the grade.

If you like, you can just roam around inside your model and reach for an analysis tool only when you need it. Say you found an unexpected ERR message in cell V19. To trace the logic path "upstream" and see what cells influence V19, you could hit

a function key and start a "Probe." *Analyst* would switch you out of the spreadsheet and show you the formula in V19 in the top part of the screen. Then, as you used the cursor movement keys to highlight the different cell references in V19's formula, the lower part of the screen would change to display the formula contained in each highlighted cell.

For example, if V19's formula were A1\*B2, that formula appears in the top part of the screen. If you highlighted either A1 or B2 with the cursor movement keys, you would see the formula contained in A1 or B2 in the bottom part of the screen. By hitting a function key, you could move the formula in A1 or B2 to the top part of the screen and examine its components in the bottom part. You can keep searching upstream until you get to a real number with no antecedents.

Figure 3 shows a probe that has traced the contents of V19 through V16, V14, V12, and D50 (the cells listed in the Probe Path). The formula for V12 is now in the top window, and D50 is highlighted, causing the formula in cell D50 to appear in the lower window. We find that D50 can produce an ERR message, which may be the cause of the ERR in V19.

It often happens that a single cell is influenced by many cells, which are likewise influenced by many other cells. A diagram of spreadsheet logic can look like a family



## FACT FILE



*The Spreadsheet Auditor*  
Consumer Software Inc.  
8315 Monterey, Suite B  
Gilroy, CA 95020  
(800) 556-6699  
(408) 848-3388  
List Price: \$149

Requires: 128K RAM,

two disk drives, DOS 2.0 or later.

**In Short:** *The Spreadsheet Auditor* is strictly a report generator, but it's fast and slick. Its report formats are flexible, and it includes such useful features as sideways printing.

CIRCLE 499 ON READER SERVICE CARD

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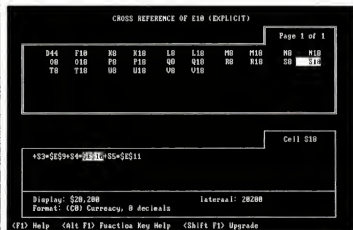
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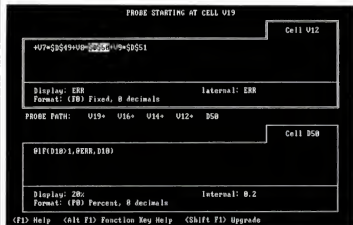
CIRCLE 317 ON READER SERVICE CARD



## ■ SPREADSHEET UTILITIES



**Figure 2:** The Cambridge Spreadsheet Analyst's interactive Xref mode generated this listing of all the cells in the worksheet that refer to E10. S18 is highlighted so that its contents and formatting details appear in the lower window. To see the cell S18 in context, you would hit the F10 key.



**Figure 3:** In The Cambridge Spreadsheet Analyst's Probe mode, you can begin at a suspect cell and trace the problem to its roots. This screen shows a probe that started at cell V19. The upper window displays the contents of cell V12, and D50 has been highlighted in order to display the contents of D50 in the lower window. Hitting F6 will continue the probe; the contents of D50 will appear in the upper window, with the contents of cells it refers to in the lower window.

tree. If you don't find a problem by probing one "branch" of the logic tree, *Analyst* lets you retrace your steps and try another. And whenever you like, you can jump back into an image of your model and examine cells in context.

Probe is one of the most effective, ef-

fortless ways to find out why a cell in your model is misbehaving. You could do the same job with a printed report of all cell formulas, but with a large model you'd be shuffling reams of computer paper. *Analyst* takes you from one cell to the next with a single keystroke.

*Analyst*'s Scan feature combs a spreadsheet for common sources of errors: formulas that refer to blanks or labels, numeric cells that aren't referenced in any formulas, overlapping ranges, cells that display ERR or NA, ranges with more than one name, and other such oddities. Scan gives you a quick count of all these embarrassments and then shows you their cell addresses and contents. Once again, you can jump right into the spreadsheet and see what's going on.

One condition that Scan doesn't catch is circular references; to go after them, you'd choose the Circ option. *Analyst* spots these very quickly and lists the addresses of the cells in the circle. One keystroke takes you back into your model for a close look.

If *Analyst*'s interactive analysis doesn't solve your problems, it can print reports like those produced by *DocuCalc* and *Auditor*. One interesting option on the cross-reference report lists not only the cells that directly reference a given cell or range, but those that are in turn influenced by the referencing cells. This summarizes all "downstream" effects in a way that more-limited reports do not.

But my guess is that *Analyst* won't be used to print many reports. It's so fast and powerful in interactive mode that you can fix most mistakes without waiting for a report. *The Cambridge Spreadsheet Analyst* won't do your job for you, but it will make it a whole lot easier.

## PC MAGAZINE FACT FILE

**The Cambridge Spreadsheet Analyst**  
The Cambridge Software Collaborative  
University Place, #200  
Cambridge, MA 02138  
(617) 576-5744  
List Price: \$149

Requires: 192K RAM, two disk drives, DOS 2.0 or later.

**In Short:** The Cambridge Spreadsheet Analyst excels at interactive analysis. Its features let you probe the inner workings of your spreadsheets to pinpoint inconsistencies and problems, and you can refer to the worksheets themselves without leaving the program.

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PC Products June 1985

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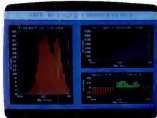
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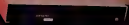
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- Automatic tape back-up feature
  - Automatic error correction

- \$2095** 20Mbyte disk/60Mbyte cartridge tape
- QIC-24 industry standard tape data format
  - Automatic tape back-up feature
  - Automatic error correction

Optional XT compatible controller:  
Add \$350

**THE SMART QIC-FILE:  
POWERFUL 60MBYTE  
BACK-UP**



- \$395** Internal 60Mbyte  
**\$495** External 60Mbyte
- QIC-24 industry standard tape data format
  - Automatic tape back-up feature
  - Automatic error correction

**THE SMART IMAGE:  
A BEST SELLER  
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- \$795** Internal  
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- 20 Mbyte cassette tape back-up
  - Automatic back-up feature
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**THE ONLY FAMILY OF AUTOMATIC  
TAPE BACK-UP SYSTEMS AVAILABLE.**

Sysgen,<sup>™</sup> already the bestseller in IBM<sup>®</sup> tape back-up systems, just got even better. Now Sysgen tape back-up works by itself, automatically! Set it once, like a VCR. The Sysgen tape backs-up your hard disk up to twice daily, seven days a week, as programmed. If you're away, your data's protected. If you're using your system, it waits until you're finished, then backs-up your data by selected files.

Automatic tape back-up is a Sysgen exclusive, and a hard disk necessity.

**Sysgen gives you the QIC-24 standard too.**

QIC-24 is the standard tape data format for interchangeable tape. A must. Sysgen is the leader.

**A rugged and reliable system: An unbeatable price/performance value.**

You need a system you can count on. Make sure you get Sysgen quality. And Sysgen disk and tape products give you more for your dollar. Take this ad with you when you shop. We invite comparison.

**Make sure you back up your data with the QIC-24 industry standard and Sysgen smart innovations.**

Sysgen systems are your *smartest* choice because they let nothing stand between you—and your work. A reliable Sysgen hard disk keeps your data on-line—no juggling disks or cartridges. And only Sysgen backs-up your data *automatically*.

Sysgen's disk and smart tape family is IBM standard compatible for all current versions of PC DOS<sup>®</sup>. Whatever your storage and back-up needs, Sysgen offers the best solution.

Compare Tallgrass.<sup>™</sup>  
Compare Bernoulli.<sup>®</sup>  
You'll buy Sysgen.  
For a Sysgen dealer near you, call  
**1-800-821-2151.**  
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**SYSGEN**  
INCORPORATED

# 15,000 SAVED FROM CRASH.

No hysteria. No panic. No reports of data loss. No wonder more than 15,000 Alpha Micro users have chosen our Videotrax™ backup technology over streamer tape or floppies.

The best news is it's now available for the IBM® PC-AT, XT and true compatibles.

## BETTER TO BE FAIL-SAFE THAN SORRY.

Exhaustive testing and long term use of Videotrax technology prove it more reliable than any other backup



High-tech. Open your PC and slide the controller board into any expansion slot. Low-tech. Hook up VCR to computer with standard connector cables.

option available. Even more reliable than the hard disk you're backing up.

At the heart of the system is a patented video tape controller board that employs a standard video cassette recorder for copying data. Which means Videotrax offers the sophisticated technology of today's VCRs. And the depend-

ability of a durable consumer good.

## EASY DOES IT.

If you own a VCR, you already own half the system. And you already know how to use it. Or you might opt for the complete subsystem (controller board plus enhanced VCR) and experience the

Your basic video cassettes. Reliable, cheap, easy to find.



joy of its automatic, unattended backup capabilities.

Either way, our menu driven software, clear documentation and wide range of backup modes keep it simple: Insert a blank video cassette tape and follow the directions that appear on your screen.

You can copy or restore your entire hard disk, specific files, or only files modified since the last backup, while the system busily self-monitors for proper functioning.

And for the price of taping your favorite TV shows, you can record your most valued computer data. Up to 80MB can be stored on a single cas-

sette at less than a third of the cost of streamer tape.\*

Of course, if you ever require service, your authorized Alpha Micro dealer and our world-wide network of factory service centers will provide all the support you need.

For more information on how Videotrax can keep you off the crash course, call your local dealer or Alpha Micro at 1-800-992-9779 (in California call 1-800-821-0612).

**VIDEOTRAX™**  
DATA BACKUP FROM  
ALPHA MICRO.



# More Laptop Power for Less from Kaypro

*Kaypro, best known for chunky but powerful CP/M personal computers, sheds its unglamorous image with this sleek and compact laptop. The 2000's heritage is evident, though, in its sturdiness and reliability.*

market: at \$1,995, it provides a lower-priced, high-quality alternative to machines like the Data General One and the Grid Portable, and Kaypro also throws its familiar line of bundled software into the bargain.

The Kaypro 2000 looks sleek. The black case, made of durable brushed aluminum, has sculpted edges and a cushioning band of ribbed rubber. With the lid down, the machine is thin but sturdy. It fits into my trusty American Tourister briefcase without a struggle. With the internal battery and optional modem in place, the computer tips the scales at just 12 pounds. The 2000 is a winner on styling.

**T**he Kaypro 2000, Kaypro's entry into the PC-compatible 3½-inch-drive laptop market, follows a long-established Kaypro tradition of offering more for less. The 2000 seems well equipped to battle for its niche in an already highly competitive

**MEETING THE COMPETITION** Internally, the Kaypro 2000 runs a low-power version of the PC's 8088 processor operating at the standard 4.77-MHz clock rate. A socket for an 8087 math processor is available. The 2000 normally comes with one row of 256K-bit RAM chips, but two more rows of chips can be added to give a total of 768K bytes of RAM. (MS-DOS can address only 640K.) Its single 3½-inch disk drive permits 720K bytes of data storage. The internal battery, which is rechargeable, is good for about 4 hours of operation, more or less depending on how much the disk drive and I/O ports are used.

The Kaypro 2000's technical features make it competitive with other PC-level systems. Its only standard I/O port is an RS-232C connection for data communications or a serial printer; an optional internal 1,200-bit-per-second modem is available for \$295. It has no built-in parallel printer or alternative video output ports. However, Kaypro does add a multipin connector on the bottom of the 2000 for various optional devices, such as a second 3½-inch disk drive, a 5¼-inch PC-compatible drive, or an expansion chassis with PC slots.



Despite its streamlined appearance and briefcase size, the 14-pound Kaypro 2000 is no lightweight—either in left or performance. Its features include a 3½-inch floppy drive, a detachable keyboard, and an LCD screen.

The 2000's program compatibility with the standard IBM PC is excellent. Kaypro uses a Phoenix Compatibility Systems ROM BIOS, which virtually guarantees the machine's ability to run all PC software that follows DOS conventions—including 1-2-3 and other products used as standard tests of compatibility. The GWBASIC interpreter supplied with the 2000 is compatible with IBM's BASICA.

**COMFORTABLE KEYBOARD** The Kaypro 2000's keyboard is its nicest and most convenient operational feature. It can be used inside the case or detached on a cable that stretches out nearly 3 feet. The keyboard has a full-sized IBM Selectric-style Return key and oversized keys for Shift, Ctrl, Tab, and Backspace. Ten special function keys are arranged along the top of the keyboard, and special keys like PrtSc and PgDn are available. The numeric keypad is contained within the regular key field; you toggle into numeric-keypad mode with a special NumLock key. The keyboard has an excellent feel and is a pleasure to work with.

**SQUINTING AT THE SCREEN** The Achilles' heel of laptop machines in this category has always been the readability of their liquid-crystal display screens. A tired but true joke goes: When someone looks over your shoulder while you are working on one of these little computers, the first thing they say is: "Turn it on!"

I set the Kaypro 2000 next to a Datavue and a Data General One and saw little difference in the readability of the screens. All are difficult to read in most situations. In a room with overhead lights, you have to constantly bob and weave your head to avoid glare while getting the best light on the few inches of the screen you are trying to read. The screens on these units are based on typical mid-1985 technology; the contrast and resolution of their 80 columns by 25 lines of text make them barely usable for most people.

Some systems, such as the Grid and the most recent model of Datavue, offer an internal video port to drive an external monitor. The Kaypro 2000 has an optional external adapter unit—the Multi-Adapter—that can hold a separate video card for an

add-on monitor. This option increases the system's price, but it does give you better readability when you're using the computer with a monitor that's on your desk.

Today's LCD screen technology can be pushed only so far. Plasma and electroluminescent screens with greatly improved clarity and brightness are available, but they are power-hungry and expensive. Zenith has successfully used internal backlighting of the LCD screen with a fluorescent panel, a technique that uses a moderate amount of battery power to give a moderate gain in readability. If Kaypro had used a backlit LCD screen in the 2000, it might look as good in real life as it does in the company's ads, but the cost would have been higher.

**EASE OF OPERATION** In operation, the Kaypro 2000 is easy and convenient to use, once you get the light set right. The machine automatically comes on when the screen is opened, but you can leave the keyboard outside of the case even when it is closed, and so the lack of an on/off switch doesn't present a problem. The computer boots from the

**PC** **FACT FILE**

**Kaypro 2000**  
 Kaypro Corp.  
 533 Stevens Ave.  
 Solana Beach, CA 92075  
 (619) 481-4300

**List Price:** Kaypro 2000 with 256K RAM and one 3½-inch disk drive, \$1,995; internal RAM expansion to 768K, \$99; expansion chassis with two PC slots, 3½-inch disk drive, and I/O ports, \$795; Multi-Adapter with I/O ports, card slot, and disk drive connections, \$155.

**In Short:** A snazzy, reasonably quiet laptop at a reasonable price, but, like most other laptops, this machine suffers from mediocre screen readability.

CIRCLE 66 ON READER SERVICE CARD

single disk drive and operates just like a single-drive PC.

Removing and inserting disks is easy. Kaypro's small disk drive pops up to eject the disk, and sliding a new one into the slot is a cinch. However, since the 3½-inch disks are even slower than 5¼-inch drives when transferring data, you'll want to use a RAMdisk whenever possible.

My experience shows that the quieter the laptop machines are, the more readily they are accepted in meetings and classes. I was present when a senior executive of a Fortune 500 company told a very junior executive with a new laptop to "Quit that typing!" during a business meeting. The keyboard of the 2000 sounds a bit clackity, and the disk drive makes a "zoop-zoop" sound. Of the three machines I've reviewed to date, Quadram's Datavue is the quietest, but the Kaypro shouldn't get you thrown out of a business meeting or the library—particularly if you avoid the "zoop-zoop" by using a RAMdisk.

■ The 2000's keyboard sounds a bit clackity, and the disk drive makes a "zoop-zoop" sound.

**BUNDLED SOFTWARE** Kaypro systems have always proved to be remarkable values, largely because of the company's practice of bundling useful and popular programs with its computers. The Kaypro 2000 package includes *WordStar* with *MailMerge* and *CorrectStar*, *StarIndex*, the *MITE* communications program, *GWBasic*, the *PolyWindows Desk* operating environment, and the *Traveling Expense Manager*. At retail prices, this bundle would cost you over \$700. If this is the software you want to use, you could easily and happily go a long time before you have to buy another program.

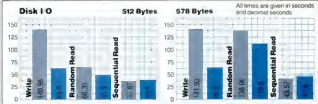
The programs bundled with the Kaypro 2000 are customized for the machine and come with an automated installation program. When you first boot the system, the installation program examines the disk in



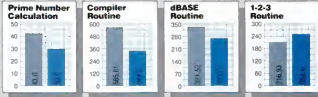
## BENCHMARK TESTS

### Kaypro 2000 vs. IBM PC

Kaypro 2000 3½" floppy disk  
IBM PC 5¼" floppy disk



The Disk Input/Output benchmark test measures the time it takes to create a 200K-byte data file using record lengths of 512 bytes and 576 bytes. The test program then performs a random read of 256 records from the created data file, followed by a sequential read of the same records.



The Prime Number Calculation benchmark test measures the speed at which the computer can find all the prime numbers between 1 and 50.

The Compiler Routine benchmark test assesses the speed of program development in the microprocessor and RAM by way of a two-step, self-timing DOS batch file using the IBM Personal Computer Linker program. Stage 1 takes a 348-line assembly code file

(ASM), converts it to binary code, and link-edits it with other binary files to make an executable (.EXE) file. Stage 2 compiles and links source code to resolve address references and make an executable file.

The dBASE Routine benchmark test for database applications assesses how quickly the machine reads and writes to disk by performing a series of disk-intensive dBASE II Version 2.4L tasks. The self-timing

DCS batch file runs a total of ten dBASE routines on 811 individual database records consisting of 154 bytes each, sorting on a database file (.DBF), indexing on 2 of the 10 data fields in each record, copying to a temporary database file, setting two indexes on a database file, appending a record, and deleting a record and picking (or removing) the data hole from the database file.

The 1-2-3 Routine bench-

mark test for spreadsheet applications, designed for a 640K-byte environment, assesses the computational speed and RAM management capabilities of the machine by using a 1-2-3 macro that performs a series of both global and individual worksheet tasks. The macro copies and recalculates a 10-cell range 499 times, moves 1,000 cells, deletes 1,000 cells, and then systematically clears the spreadsheet.

The Kaypro 2000's 3½-inch floppy drive was slower than the PC's 5¼-inch drive on all disk I/O tests except sequential read. A low-power 8088 microprocessor kept the 2000 from performing well on most of the benchmark tests, though it surprised us on the 1-2-3 routine.

use. If it is a master distribution disk, you are prompted to insert a new diskette, and a copy of the program is made automatically. The installation program makes full use of the available system RAM to reduce the amount of disk shuffling you have to do in this single-drive machine.

**CONNECTING TO AN IBM PC** Several optional devices add to the 2000's ability to interconnect to an IBM PC and to use PC hardware. Two types of adapter units can mate with a connector on the bot-

tom of the 2000, giving it more expansion capabilities. The first—the \$155 Kaypro Multi-Adapter—has a parallel printer port, connections for external 3½-inch and 5¼-inch disk drives, and an expansion slot for one half-size color/graphics board. Kaypro sells a color board that will work in this slot for \$195—but you still need a monitor. The second—a \$795 expansion chassis—has two full-size IBM-compatible slots, one 5¼-inch disk drive, a serial port, a parallel port, and space for one additional drive of either type.

At last! - Fast, On-screen

# FLOWCHARTS

And Organization Charts

Finally! An on-screen flowchart processor that knows about flowcharts and organization charts - not just another "screen draw" program that makes you do most of the work.

**Interactive EasyFlow** is a powerful full-screen graphics program dedicated to flowcharts and organization charts. With this program you can quickly compose charts on the screen. More important, you can easily modify charts so they are always up to date.

**Features:** • Text is automatically centered, character by character, within shapes as you type it • Text formatting controls allow you to over-ride the automatic formatting where desired • Lines are created by specifying the starting and ending points - the program automatically generates the route • Powerful editing facilities allow shapes and even entire rows and columns of shapes to be inserted or deleted; lines are automatically re-routed as necessary • Large chart size (up to 16 shapes wide by 16 shapes high) allows very large flowcharts and organization charts to be handled with ease • Charts can be larger than the screen - the window into the chart scrolls both horizontally and vertically as necessary • Flexible printer interface allows it to work with all

printers, not just dot matrix printers. Wide charts can be printed in strips. Also works with Hewlett-Packard 7475A (and compatible) plotters • Twenty standard flowcharting shapes included • Common shapes supplied in three sizes • Extensive manual (125 pages) includes many examples • Context sensitive "help" facility provides immediate assistance at any time • Any number of titles can be placed on a chart • Commentary text blocks can be placed anywhere in the chart • Fast: written in 8088 assembler • Plus many more features than we can mention here.

Requires at least 256K memory, DOS-2 or higher and an IBM or Hercules compatible graphics card.

Order direct for only \$149.95 + \$2.00 S&H (USA/Canada), \$10.00 (foreign). Payment by MO, check, VISA, COD or Company PO. Rush orders accepted (\$15.00 S&H; USA/Canada only). Rush orders received by noon will be delivered the next business day (to most locations).

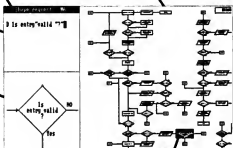
The sample screen display shown below is typical of what you see while editing a chart. Other screen displays are provided for entering titles, changing options, getting "help" and so on.

STATUS BAR (not to be confused with a wet bar) tells you what Interactive EasyFlow is doing at all times.

TEXT/MESSAGE WINDOW used to enter user text and to display messages from Interactive EasyFlow.

CURRENT SHAPE WINDOW - shows the content of the current flowchart shape (the one under the SHAPE CURSOR) in complete detail.

CHART WINDOW gives an overview of your chart; this example shows the "normal" view. "Close-up" view shows a smaller part of the chart in more detail. "Wide-angle" view shows a larger part of the chart at reduced size.



SHAPE CURSOR shows where you are in the chart. Cursor keys move it around; chart window scrolls if you run off the edge of the window.

**HavenTree Software Limited**  
P.O. Box 1093-P  
Thousand Island Park, NY 13692  
(613) 544-6035 ext 49

CIRCLE 201 ON READER SERVICE CARD

## ■ KAYPRO 2000

For an additional \$95, you get a PC Interface Card. This package includes a circuit board that you insert into an expansion slot in a standard PC, plus a cable that connects to the Multi-Adapter. The PC Interface Card lets you use a disk drive in a host PC as if it were a part of the 2000. Otherwise, you can buy a \$295 external 5 1/4-inch disk drive that attaches to the Kaypro 2000's Multi-Adapter. Since this drive uses the IBM PC format, disks can be exchanged between the 2000 and standard PCs. A second 3 1/2-inch external drive for the 2000 is also priced at \$295.

Because the 2000's principal output port is serial and most printers are parallel, Kaypro offers a serial-to-parallel adapter for \$65. You won't need this adapter if you have either the Multi-Adapter or the Expansion Chassis.

■ A PC Interface Card lets you use a host PC's disk drive as if it were part of the 2000.

**ON THE ROAD** The bottom line in all this expansion capability is that you can have a two-disk-drive, color-video desktop PC with parallel and serial ports and 768K of RAM for \$2,739 (plus the color monitor). When you are ready to leave, you can just close the lid, pick up the machine, and tuck it into your briefcase. On the road, you lose one disk drive, a parallel port, and color, but you retain all the rest of the Kaypro's basic functionality.

The Kaypro 2000 has snazzy looks, it operates like a standard PC, and its options offer plenty of computing power and make it easy to exchange data with standard PCs. The price is right. The design is excellent, surely comparable with that of any machine in its class. Unfortunately, its screen readability is also comparable to that of the other laptop machines. If you try the 2000 and can live with the display, buy it. ☐

Frank J. Derfler, Jr., is a contributing editor of PC Magazine.



# Microsoft Introduces Power Windows.

# It's going to open your eyes.

Microsoft® Windows has arrived.

For anyone who uses a computer in earnest, that is extremely good news.

Windows gives you a practical way to integrate programs. It radically decreases the time it takes to move from one application to another. Dramatically simplifies the means of consolidating data from many different programs.

And, as a graphical extension of the MS-DOS® operating system, it gives you a highly visual way to work and to organize your work.

In short, Windows brings efficiency to all those processes of personal computing which have till now been awkward, unwieldy, inconvenient.

## The joys of job hopping.

With the advent of Windows, you can work with multiple applications. And switch from program to program with ease.

Start up with one application, then another, and another. Leap back and forth between applications as your work routine dictates. Then pick up right where you left off.

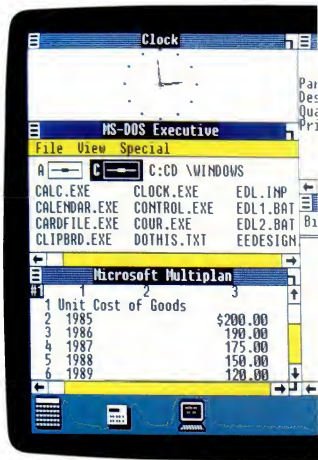
The ability of Windows to change quickly from program to program logically and naturally magnifies the utility and productivity of the personal computer. And is a

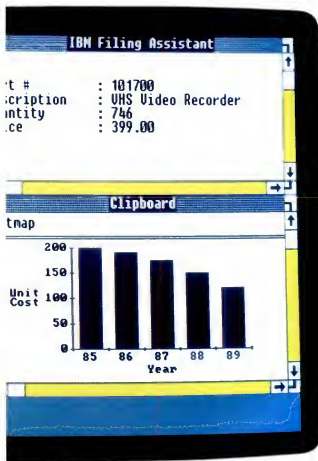
recognition of the way people who exploit the power of PCs really do their jobs.

## Breaking the 640K barrier.

Just like you, Microsoft Windows can handle several projects at the same time. Juggle assignments. Deal with frequent interruptions.

And Windows will ignore the 640K limit of your PC, especially if you have a hard disk, the Intel® Above™ Board, or expanded memory. It will execute the rather neat trick of working with more programs than memory can hold at one time.





### Spreading knowledge.

Another great service Windows performs is accelerating the movement of information from one program to another.

Collecting and combining that information is as simple as taking a "snapshot" of data in one program. Editing it. Then consolidating it with data from other programs.

With Windows, you can enjoy the advantages of conventional integrated programs without their compromises. Because Windows lets you put together the applications that you know, and that get a job

done for you.

Choose your best word processor, spreadsheet, database—you name it. They're all there for you at a keystroke.

### Common ground.

Finally, Windows is not only an immensely powerful tool for today, it's also a solid base for a new generation of Windows applications.

As an introductory offer, two of these—Microsoft Windows Write and Paint—are included in the package. Along with more than a dozen other programs.

In Windows applications you have a common interface which includes drop-down menus, dialog boxes, icons. Along

with a richer environment that allows you to mix pictures and text. And to summon different type faces and styles at a keystroke.

Windows is a bridge between today's applications and the graphics based software now evolving. A way to work interchangeably with today's programs. And tomorrow's.

If you're someone who uses personal computing as a natural part of your work life, who capitalizes on the productive powers of sophisticated applications, look into Windows, a new vision of what a computer can do.

# Windows breaks down walls.

Windows lets you freely combine information from all your applications. And gives you the means to organize, compose, format and print it.

The staging areas for this consolidation are Windows Write and Windows Paint. Two

graphics based programs which are bundled with the Windows package.

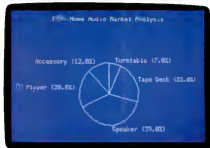
Here you highlight, expand, and compose text, charts, and illustrations drawn from a variety of programs. Then polish it all for printing.



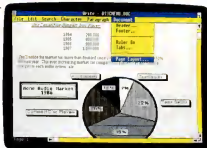
Spreadsheet information from Lotus® 1-2-3® can be captured. And then transferred to Windows Write, our graphic word processing program for consolidating, editing, and formatting.



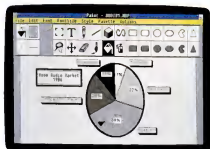
Data from dBase II® can also be copied and transferred to Write.



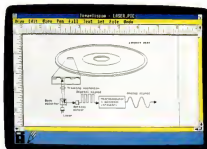
Using your spreadsheet data, build a Lotus chart. Then capture it from the screen. And paste it into Windows Paint.



Windows Write is a straightforward and able word processor. It serves as the 'great integrator' in Windows. The place where text and graphics from all your other programs are organized and formatted for presentation. What you see on the screen is what you'll get on the printout.



Windows Paint is an illustrator's studio. A palette of graphic tools. Use Paint to create drawings and diagrams. Or, in this case, to enhance a 1-2-3 chart to emphasize your point.



In-A-Vision, a Windows application by Micrografx, Inc., is a computer-aided design program. Its highly detailed technical illustrations are easily transferred to other Windows applications.

**Consumer Audio Incorporated**  
**11705 Wellington Parkway**  
**Morristown, New Jersey 07960**

Clifford Swain  
 Central Audio/Video  
 2202 W. Market Street  
 Chapel Hill, NC 27514

Dear Mr. Swain:

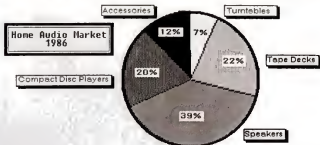
As a major supplier of compact disc players in the audio market, it is my pleasure to introduce you to Consumer Audio. Our product line includes all major brands of audio equipment and accessories including the latest in compact disc technology.

Compact discs have revolutionized the art of sound reproduction. Their acceptance as a universal standard for home-use audio has made way for numerous business opportunities in selling related equipment and accessories.

As shown in the table below, the unit demand for compact disc players is rapidly increasing. Consumer Audio is committed to supporting you in every possible way to capitalize on this tremendous opportunity.

<u>Unit Demand for Compact Disc Players</u>		<u>Estimated Revenues</u>
1984	208,000	\$ 82,992,000
1985	600,000	239,400,000
1986	900,000	359,100,000
1987	1,100,000	438,900,000

You'll notice the market has more than doubled since 1984 and is expected to grow 50% this next year. This ever increasing market for compact disc players can add notable margins to each audio system sale.

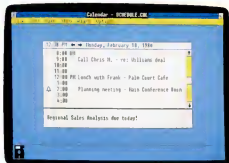


The chart above indicates projected market share of the major segments of the home audio market for 1986. The compact disc segment is a marked increase from 1985.

This is Windows' finished product. And it's highly finished, indeed.  
 An exact representation of what you produced on-screen. The  
 better your printer (in this case a laser) the better the results.

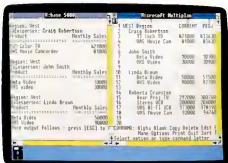
# Spend a day with us. You'll

One of the great beauties of Windows is that in the here and now you enjoy the benefits of computing's future path—graphically oriented software. Without giving up any of the applications you're happy with today.



7:45 AM. Early as usual. Opening Windows lands you in the MS-DOS Executive, the Windows command center and file directory. Run the Windows Calendar program and see what's up for the day.

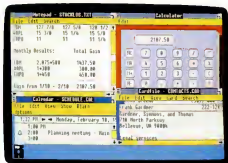
In addition to Windows Write and Paint, the Windows package includes a collection of desktop applications you can use to manage your day-to-day activities. A calendar, cardfile, notepad, calculator, and telecom-



7:55 AM. You've got a report due by the end of the day. A comprehensive sales analysis. Bring up Multiplan® and R:BASE 5000® Copy regional sales data from R:BASE into Multiplan.



1:30 PM. Market's closed. How'd you do? Open Terminal to dial Dow Jones News/Retrieval® and check the final quotes. Copy and paste them into Notepad.



1:45 PM. You did pretty well today. So use the Windows Calculator to figure your gains. Which you duly note in Notepad. Your good luck, however, requires a call to your tax attorney. A quick click brings up his listing in Windows Cardfile. Another click dials him automatically on your modem.



## The first reviews are in. Here's what they see in Windows.

Prominent reviewers and industry experts have been eagerly awaiting the arrival of Microsoft Windows.

Now they've had a good look. And we're pleased to record their responses to what they saw.

"I'll bet on Microsoft Windows."

Jonathan Sacks, West Coast editor of *Popular Computing* magazine.

"You've got a clear winner..."

Stewart Alsop, editor and publisher of *P.C. Letter*.

"...Windows looks very good..."

Peter Norton in his column in *PC WEEK* 9/24/85.

## Of course, all this is going to cost you: \$99.

A price that makes Windows the most startling value ever offered in software.

A comparable collection of programs—a switching program, a graphic interface, desktop applications, a word processor, a drawing program—could easily cost hundreds of dollars more.

Windows will instantly deliver you a more productive present. And a leap into the future.

A future which, frankly, we have no interest in keeping exclusive. At this price,\* it looks to be arriving in a rush.

## Check out the view.

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## PUTTING IT ALL ON FILM:

# SCREEN CAMERAS AND FILM RECORDERS

*The technology for capturing screen images has improved dramatically in recent years. Two approaches offer business users greater flexibility in the quest for persuasive presentation graphics.*

**B**usiness graphics has become one of the most exciting, fastest growing, and fastest changing areas of personal computing. But the PC alone is only half of the business graphics revolution. Although it is a preeminent image maker and manipulator, it's an ineffectual image communicator.

To be truly useful, the colorful charts and images created by the PC must be communicated and shared. And even when a PC is connected to the sharpest color monitor running the best graphics software, only a few people at a time can gather around the phosphorescent picture, and the quality of the picture they see on the screen is usually a disappointment.

Printers and plotters are popular solutions, but they can't serve all needs. For audio-visual presentations, printed material, and other applications in which impact and image quality count, two subtly different technologies have won favor: screen cameras and film recorders. Both put PC pictures on film, usually 35mm slides.

Besides the higher quality of their output and the more versatile medium they use, screen cameras and film recorders hold several other advantages over paper-based graphics communication technologies. Plotters and ordinary graphics-capable dot matrix printers are generally slow, and their output usually has a distractingly rough appearance. Although the quality of laser printer images can be higher and laser throughput faster,

most laser machines are limited to monochromatic output and usually cannot create transparencies.

Almost 3 years ago, when *PC Magazine* first investigated the PC's film-imaging abilities with a look at screen cameras, the technology was in a rudimentary state (see "Screen Gems: From Monitor to Film" and "Points of View: Comparing the Cameras," *PC Magazine*, Volume 2 Number 3). Although the photographic image-capturing process had been refined over 150 years of development, the link between the PC standard and that established technology was primitive. The images that those early screen cameras cap-

## ■ PUTTING IT ON FILM

tured could be no better than the roughly drawn pictures that the PC painted on its original display tubes.

Finding a unit that would plug into the RGB video output of the PC was an adventure in itself, not only for purchasers but also for the equipment manufacturers. During the first *PC Magazine* tests, more than one screen camera manufacturer delivered its products accompanied by a bevy of engineers charged with making the camera compatible with an interface standard they had never before encountered.

These first screen cameras themselves were little more than reworked raster-oriented cameras designed to work with genuine video sources, analog signals like the RS-170 standard that circulated through television stations rather than personal computers. Three years ago the screen camera manufacturers seemed to think that the PC was no more than a passing fad and that its RGB output standard would be accepted only by a few technophiles.

Today, the selection of image-capturing devices demonstrates that nearly every manufacturer has committed itself to supporting the PC. The five products explored in this article demonstrate how tightly this market now embraces the PC standard. At the low end of the range, the critical dimensions of the minimalist Datacam 35 are precisely scaled to match the size and shape of the IBM Color Display. At the high end, design engineers at Matrix Instruments Inc. have written elaborate software and created novel hardware to get the most quality possible from the PC while remaining within the constraints of the various PC standards.

**A TALE OF TWO TECHNOLOGIES** The terms *screen camera* and *film recorder* are sometimes mistakenly used interchangeably, and the products are often lumped together as one equipment category because both devices seem to have the same purpose—capturing computer images on film. But the two terms describe pieces of equipment that are very different in both function and philosophy.

The screen camera seeks to duplicate as closely as possible on film the image that is displayed on the monitor of a PC. Its goal is to capture as exact a replica of the video display screen as it can. To achieve that

goal, a screen camera either snaps the image directly off the screen of a PC or copies the image onto its own, higher-quality monitor and snaps it from there. The higher-quality tube still displays the same image as the PC monitor, however.

Screen cameras plug directly into the PC's display adapter and can make photo-

### EDITOR'S CHOICE

*The best all-around choice is the Polaroid Palette, which can do double-duty as a screen camera and film recorder. Its combination of affordable price and very good quality has made it both an industry standard and the preferred foundation upon which other film imaging systems are built.*

*Keep in mind that the film imaging device you choose depends primarily on your application. For a fast and cheap record of what's on the screen, the Datacam 35 is the easiest to use—just point and shoot. When quality counts foremost and you don't care about cost, the Matrix QVP-PC/Matrix PCR system yields the best on-film results.*

graphic images from any software that uses normal PC graphics. As a consequence, the film image has all the limitations of the standard PC color display—a very limited color palette and low resolution. Although these images will improve as more screen cameras adapt to the newer, higher-resolution IBM Enhanced Graphics Adapter, they still remain limited by the design trade-offs IBM has made and continues to make in selecting its monitor standards.

The film recorder does not suffer such limitations because it doesn't duplicate screen images. Instead, it traces on film entirely new images generated by software running on the PC. For the most part, only this software must conform to the PC standard. Film recorders are in most cases not compatible with the standard PC display adapter.

The PC only generates the data that will

be used in constructing the final image; it sends this information to the recorder as a series of instructions on how to generate the final, on-film image. The instructions required by the film recorders of various manufacturers have no standard form. In most cases, a high-level programming language is used to code them, but usually that language is proprietary, perhaps specially developed for one particular film recorder or manufacturer.

Not every graphics program can control every film recorder. In order for a software package to communicate directly with a film recorder, it requires special driver software or the built-in ability to manipulate the proprietary language of that specific film recorder. For instance, although you might be able to use BASIC to send image information to a film recorder, the program code required would bear little resemblance to graphics commands. It would instead be little more than a series of output statements.

Consequently, the film recorder you choose depends on the software you want to use. Your graphics software must have the ability to drive the film recorder you own or are thinking of buying.

A film recorder also requires a communication channel with its host computer. These usually use serial ports, although some recorders require their own adapter cards, which often have on-board buffering and perhaps even microprocessors.

In their software and connection requirements and (usually) their lack of exact preview display, film recorders are in many ways comparable to color plotters. In fact, some film recorders (such as the Bell and Howell Color Digital Imager IV and the Lasergraphics MPS-2000 reviewed here) are compatible with plotter-driver software like HPGL (Hewlett-Packard Graphics Language).

**BETTER THAN SEEING** Because the PC does not itself create the final picture that the film recorder will make, previewing the exact on-film image on the PC's own monitor is impossible. The PC display can only reveal an approximation of what the final film will show. The finished product, the film image, is more important than the screen display, so most film recorders offer only a rough preview of what

you can expect to see once the developing is done. Although not seeing the final image until it has been processed can be a hardship when you demand instant gratification or intimate control over the images that you generate, it does offer the film-recorder designer many advantages.

Compared to screen cameras, film recorders are complex, expensive systems. Although rife with minor drawbacks, the strategy of opting for the film recorder gives one major benefit: quality. The film recorder can be designed to give resolution an order of magnitude (or more) greater than that which the PC or any screen camera can handle. Because a film recorder does not demand a real-time display of the image that it makes, the image-processing time inside the recorder is less of a concern.

Free from the limitations of the IBM standard, film recorders can have a multitude of extra features that give you more quality and convenience. Typically, film recorders have wide color palettes; they are not limited by the 16 or 64 hues of the PC standards. (Both screen cameras and film recorders are capable of making images with very pure, highly saturated colors by recording each primary color separately through its own, narrow-spectrum color filter from a single, high-quality monochrome tube, but film recorders have much wider spectra.) Often they have built-in typeface fonts that speed image transfer and image creation as well as adding to the finished quality of the image.

#### IMAGE PROBLEMS WITH CAMERAS

For screen cameras, many aspects of image quality, such as resolution, are determined by the IBM display standard, which imposes such minimal requirements that even the most-inexpensive systems have no difficulty meeting them. However, screen camera systems do differ from one another in several aspects of their performance. The two important issues are distortion and fidelity.

Distortion in screen camera images can arise optically and electronically. The principal optical distortion problem in inexpensive screen-imaging techniques is image curvature. Because most inexpensive cathode ray tubes have curved faces, straight lines displayed on them tend to

## DO-IT-YOURSELF SCREEN PHOTOGRAPHY

*With the right equipment, you can eliminate the glare, inadequate exposure, and poor-framing defects that crop up with most do-it-yourself computer screen shots.*

**T**aking a photograph of your computer display is one of those jobs that's easy to do but hard to do well. You can point just about any camera at your computer's monitor and get a photograph of something, but snapping an image that communicates more than technical ineptitude requires some planning and equipment.

Just snapping a picture of the monitor inevitably results in several image defects: glare, inadequate exposure, and poor framing. If you're careful, however, you can eliminate most picture problems, except for the distortion caused by the curvature of your monitor's screen.

The equipment you need is a camera capable of making an exposure of  $\frac{1}{4}$  second or longer (a 35mm single-lens reflex camera is a good choice), a tripod, a cable shutter release, a good-quality computer display, and a darkroom or moonless night.

**A DARK SETTING** Set up your computer in a room that you can completely darken, or wait until nightfall. Set up your camera on a tripod to prevent blurring the image during the long exposure you're going to need to make. The cable release will also help prevent camera shake during the exposure and keep the picture sharp.

With the lights still on in the room, focus the camera on the computer display and carefully frame the image so that the display appears squarely in your camera's viewfinder. Make sure that the back of the camera is parallel to the face of the computer display to eliminate distortion. The center of the lens should be at exactly the same height as the center of the display.

Douse the lights. Now adjust your computer monitor for its best image. Of-

ten, you can improve the sharpness of the image by turning down the brightness of the tube. Adjust the contrast control so that highlighted characters are easily distinguished.

Using the light meter built into your camera, take a reading of the display. With most normal display images, you need make no adjustment from the camera settings indicated by the meter. If, however, your screen is primarily white, you may want to open the iris of your camera by one or two f-stops to compensate.

If you have a camera without automatic exposure, set your shutter speed to an exposure time of  $\frac{1}{4}$  second or more. With aperture-preferred automatic exposure cameras, you will usually get acceptable results by setting the aperture to f/8 and exposing automatically. Often the exposure time will be several seconds.

The long exposure allows several video frames to be captured; this minimizes variations in intensity across the image caused by the sweeping electron beam. (An exposure of less than  $1/60$ th of a second will show only part of the screen image.)

Finally, make the exposure with the room lights off to eliminate glare. Do not use a flash.

**A NOTE ON FILM** Because the color temperature of the phosphors of most color tubes is about 5,500 to 6,000 degrees kelvin, daylight film gives the best color match to video phosphors. Ektachrome 64 or 100 Professional film (or its equivalent) is a good choice and can be developed in an hour by many local photo labs. Kodachrome 64 also works well but requires more time-consuming development.—Winn L. Rosch

## ■ PUTTING IT ON FILM

bow and bend. Typically, lines parallel to the screen edges bow outward to give rectangular figures a convex shape, a problem called "barrel distortion." The opposite problem, "pincushion distortion," makes rectangular figures look concave; it is rarely seen because physical screen curvature is invariably convex.

Although on film these crooked lines are a realistic representation of what the typical computer monitor displays, such curvature is usually undesirable and distracting in presentations. Better-quality

## ■ Jaggies are inherent in the digital process, and you can never get rid of them entirely.

screen cameras (and nearly all film recorders) have their own flat-faced CRTs that eliminate this form of distortion.

Electronic image distortion is a result of defects in the scanning signals that control the display. Images may be too wide or high, or, like fun-house mirrors, identical shapes may not seem identical when they appear on different portions of the screen. The most obvious result of this sort of distortion is an odd aspect ratio, which makes objects that should appear as perfect circles look elliptical or pear-shaped. Because this distortion is caused by electrical circuitry, it can usually be corrected and is more often a sign of a poorly adjusted system than of a poorly designed one.

Image fidelity refers to how close the film image is to the screen it represents. A principal issue is color. The screen camera must be able to duplicate the admittedly limited PC color display spectrum, including the sometimes elusive brown.

Like color displays, screen cameras can have problems with convergence, the accuracy with which the three primary color beams overlay each other to create intermediate colors. When convergence is poor, what should appear as a single white dot may actually resemble three distinct dots, one of each primary color. At high

magnifications, even a perfectly converged white dot on a color CRT will break down into three closely spaced color dots. Better screen cameras avoid or minimize both of these problems by using monochrome (black and white) CRTs and making a separate exposure for each of the three primary colors through the appropriate color filters.

For screen cameras that create images from the CRTs of ordinary computer displays, the display and film you use determine color fidelity. For screen cameras with their own CRTs, other factors that affect color fidelity are filter colors, the relative duration of the exposures through the different color filters, and the control software built into the camera.

**IMAGE PROBLEMS WITH RECORDERS** Image quality issues for film recorders include, among others, distortion and color fidelity. With film recorders, resolution is not limited by the constraints of the IBM PC display standards but instead by the design of the film recorder itself. The higher the resolution, the sharper the image.

Related to the resolution in film recorder images is the issue of digital remnants—diagonals, instead of appearing as smooth sweeps, look steeple or jagged. The traditional way of fighting these digital remnants, termed *jaggies* by the cognoscenti, is to increase the resolution of the display. The individual digital steps get smaller as resolution increases.

Jaggies are inherent in the digital process. You can never get rid of them entirely. However, film recorders and screen cameras that have their own display tubes can mask them by filtering (eliminating the high-frequency components in a video image, usually by analog means), by digital raster-filling techniques, and by using a wide electron beam to trace the image.

**REAL-WORLD PRODUCTS** The five image-recording products reviewed here run the entire gamut of the screen camera/film recorder marketplace. Each has its own purpose and recommendation.

The Datacam 35 is a genuine minimalist device in all aspects except usefulness. Its on-film quality is low, an exact match for the IBM display standard. It suffers

## TESTING FOR IMAGE QUALITY

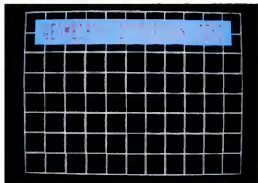
*The Matrix QVP-PC/Matrix PCR rates superior in resolution and geometric distortion tests.*

The only valid way to compare screen cameras and film recorders is to evaluate their output. My tests revealed three distinct levels of quality, based on the cathode ray tubes used by the various imaging devices. The Polaroid Palette and the units that are built around it (the Bell and Howell Color Digital Imager IV and the Lasergraphics MPS-2000) proved to have roughly equivalent on-film quality; in the screen shots, reproduced here, I used the CDI-IV's output to represent that group of devices. At the low end of the spectrum, the Datacam 35 gave ample visual evidence of the shortcomings of the imaging abilities of a standard color monitor CRT. At the high end, the Matrix QVP-PC/Matrix PCR easily proved its superiority.

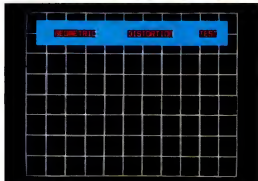
The results of the geometric distortion test showed great image curvature on the Datacam 35 pictures. This distortion was absent from all of the Palette-based devices and the QVP-PC/PCR, which generated perfectly flat grids.

The resolution test brought out the biggest differences among the systems. These images show lines that are spaced at roughly 1 degree converging on each corner (the spacing is somewhat uneven, and the images vary slightly owing to the addressing limitation of the software used). In the image produced by the Datacam 35, the lines are completely indecipherable—they barely resemble lines at all. The Palette-based devices handled the spiderweblike image reasonably well, although the image blocked up severely in the corners. The Matrix QVP-PC/Matrix PCR kept individual lines distinct almost to the resolution limits of the film. —Winn L. Rosch

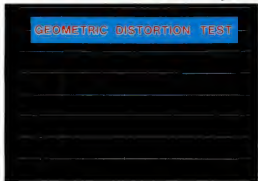
## GEOMETRIC DISTORTION TEST



*At the low end, the Datacam 35's distorted and fuzzy output is typical of a standard color monitor CRT's shortcomings.*



*The Bell and Howell CDI-IV and similar middle-range cameras show no geometric distortion and score fairly well on resolution.*



## RESOLUTION TEST



*The high-priced Matrix QVP-PC/Matrix PCR earns its keep by producing clean, distinct, high-resolution images.*

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<b>1Step Software</b>		
*Golf's Best (Pinhurst)	32	
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## ■ PUTTING IT ON FILM

from image-curvature distortion caused by the screen that it photographs, and the pictures it makes are virtually identical to those you'd expect from a do-it-yourself photography job (see sidebar, "Do-It-Yourself Screen Photography").

But the Datacam 35 holds a substantial advantage over going it alone—you need neither tripod nor darkroom. Just pick it up and snap a picture.

The Polaroid Palette is a bridge between the world of screen photography and film recording. Depending on software, it can function as either a screen camera or film recorder.

A screen camera using software provided by Polaroid, the Palette struggled to duplicate graphic screens exactly. Yet its images were an improvement over those of the Datacam 35 in that they eliminated all geometric distortion.

As a film recorder, the Palette is a capable worker with moderately high resolution and compatibility with an ever-growing library of software. It is an emergent standard and well worth consideration.

Bell and Howell improves on the Palette by integrating its imaging hardware into a complete system, the Color Digital Imager IV (CDI-IV) hardware and *Graphics Express* software. Although as a film recorder the ultimate, on-film quality of this system cannot be any better than that of the Palette, new software also allows it to emulate a screen camera but produce a higher-quality film image.

However, the biggest advantage of the Bell and Howell CDI-IV is its integrated approach. You can assemble a complete presentation graphics system from a single purchase. It will thus be easier to set up and master than a custom installation.

Although based on the same Polaroid engine, the Lasergraphics MPS-2000 adds sophisticated image processing to the basic capabilities of the Palette. Similar to the Bell and Howell, image quality as measured by resolution will be no better for these improvements, but the system is more versatile and more compatible and can be a substantial time saver.

The Matrix QVP-PC and Matrix PCR system represents the state of the art of PC-based film recording technology. Although expensive, its quality pushes the 35mm film medium to its limits.

## DATACAM 35

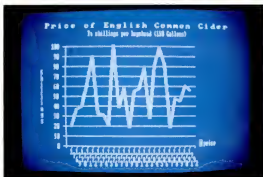
The Datacam 35 is a screen camera in the purest sense of the phrase, and it's the least expensive way of getting a PC image on film that we've tested. The Datacam 35 is also the easiest to use of the devices here: all the instructions necessary to operate it are contained in six sentences glued to its top surface.

Built around a 35mm camera, specifically a Minolta X-370, the Datacam 35 is no more than just a lens with attachments that optimize the visual image and match it with the camera, and a plastic hood that mates perfectly with the IBM Color Display (and the physically identical IBM Enhanced Color Display; additional models are available for other screen sizes). It's

the equivalent of setting up your camera in a darkroom to take a picture of your monitor screen, yet it simplifies things immensely by eliminating the need not only for the darkroom but also for framing and focusing the camera.

The Datacam 35 actually does a small bit of passive image processing. Besides a fixed-focus moderately wide-angle lens (a 35mm focal length, f/2.8 Tokina), it also uses a Minolta No. 0 close-up adapter and a rather unusual Spiratone PSC Moire Elimination Filter. This last element serves to blend the individual dots and scan lines of the video image together, and judging from the finished slides it enhances image quality.

The Datacam 35 also includes two large handgrips, one on either side of the Min-



*Since it's not much more than a 35mm camera with an attached hood, the Datacam 35 is an easy and affordable way to capture screen images. Its Minolta X-370 camera uses a filter that blends dots and scan lines together, enhancing the screen image. All you need to do is snap the shutter and wind the film. The black plastic hood fits an IBM or compatible display snugly. The quality of the Datacam 35's images is mostly dependent on your display and can't compensate for its failings. The geometric distortion depicted above is due to the curvature of the display's screen.*

olta camera body, with which you can hold the whole camera assembly securely in front of your monitor. Just under where your right thumb rests, there's an extension shutter release.

To use the Datacam 35, you first display the image you want to capture on your color display. Then just push the wide end of its funnel-like hood against the display and press down with your thumb. The shutter opens with a click and the automatic exposure mechanism of the camera holds it open for the required period. When the camera clicks again, signifying that the shutter has closed, you can relax and take the Datacam 35 away from in front of your monitor. You must manually wind the film to cock the shutter and advance the film for the next exposure. Presumably, you could add a Minolta motor drive to the camera to relieve you of this admittedly minimal effort.

This simple system has several weaknesses. Because the hood and the monitor are not firmly attached together, any shaking of your hands can lead to a fuzzy picture, and since exposures take several seconds, some shaking seems inevitable. Too, the automatic exposure of the camera seems inappropriate for judging video images that might just consist of a few bright lines against a black background.

Neither problem was apparent in test exposures. The hood fits the monitor tightly enough so that together they probably shake as a unit. The automatic exposure is evidently close enough for most purposes.

In fact, the latitude of the Ektachrome film used for the tests showed little apparent difference when I manually set the exposure to one stop brighter or dimmer than the autoexposure deemed appropriate.

The Datacam 35 cannot solve all the problems inherent in simple screen photography, however. The test images show the distortion caused by the curvature of the screen. Furthermore, any shortcomings and misadjustments of your monitor will be apparent in your exposures. The Datacam 35, like any true screen camera, can never make an image better than the one displayed on your monitor. Within its limitations, however, it is an excellent choice for simple, inexpensive image capturing.

## POLAROID PALETTE

The Polaroid Palette was introduced too late to be included in *PC Magazine's* last look at screen cameras. Since then, however, it has led a revolution in imaging technology. Not only has it become the standard by which PC-based video imaging devices are judged but the Palette's imaging electronics and mechanical assembly have also become part of many film recorders. Both the Bell and Howell and Lasergraphics MPS-2000 systems reviewed here are built around it.

The Palette has become an engine of choice for several reasons. It offers high quality, sturdiness, and simplicity all in a compact package. At its heart is a small black-and-white cathode ray tube measuring about 2 inches diagonally. Between the tube and the film plane is a color wheel with red, green, and blue filters. A motor rotates each filter sequentially into place. When the Palette is not imaging, the aperture through which the CRT is viewed is covered by a blank metal section of the filter wheel.

The front panel of the Palette is solid metal except for that one aperture. Normally, a camera of some kind covers the aperture, secured by two sturdy, coarsely threaded screws. Polaroid supplies two camera backs as standard equipment with the Palette. One is what you'd expect, an instant film Polaroid back that produces 3½- by 4¼-inch color or black-and-white

images on Polaroid pack film.

Alternatively, you can attach a 35mm camera to the Palette. Polaroid supplies a Minolta camera body; the review unit included a Minolta XG/A. The attachment bracket for this camera has the required close-up lens built-in, and it mounts using the camera's normal bayonet flange. A motor-winder is supplied with the camera to automatically advance the film. The electronics of the camera and the winder receive power through a thin umbilical cable connected to the Palette, and a second cable activates the shutter of the camera.

Before you use the Palette, you must adjust the single user control—video threshold—on its back panel (the manual guides you in this process). Three other controls can be adjusted with a screwdriver: horizontal size, horizontal centering, and brightness.

When you use the Polaroid Palette as a screen camera, the video input is a single composite connector on its back panel. However, the Palette does not merely duplicate the admittedly low-quality image that would be displayed on a composite monitor. Rather, Polaroid supplies software called *Psaver* that uses the composite input for part of the video information and a serial port to send special controlling signals. The image is manipulated in such a way that only black-and-white information is sent through the composite channel, thereby eliminating the limitations imposed by the color subcarrier in normal



### FACT FILE

#### Datacam 35

Photographic Sciences Corp.  
P.O. Box 338  
Webster, NY 14580-0338  
(716) 265-1600  
List Price: \$875

**Requires:** IBM Color Display, IBM Enhanced Color Display, or compatible monitor with same screen size.

**In Short:** A hood that fits the IBM Color Display turns a regular 35mm Minolta into a screen camera. Its output is great for a hand-held camera, but it picks up the curvature of the screen and any distortion in your monitor.

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### FACT FILE

#### Polaroid Palette

Polaroid Corp.  
Industrial Direct Marketing Division  
784 Memorial Dr.—3M  
Cambridge, MA 02139  
(800) 225-1618

**List Price:** \$1,999 including 35mm camera and pack film back

**Requires:** Serial port, IBM or compatible CGA board with composite video output.

**In Short:** The Palette can work as a screen camera or a film recorder. Its output and ease of use have made it an industry standard, and several other manufacturers have designed their film recorders around it.

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<b>COMPARE:</b>	<b>Princeton SR-12P</b>	<b>IBM 5175</b>
Dot Pitch (The lower, the better.)	.26 mm	.31 mm
Sugg. Retail Price (The lower, the better too!)	\$999	\$1295
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Designed for demanding professionals who won't settle for anything less than the finest color graphic capabilities. Displays more than 4,000 brilliant colors...features an anti-reflective coated black matrix tube for less fatigue and eye strain. You get the sharpest graphics and text... at a substantial savings!

<b>COMPARE:</b>	<b>Princeton HX-12E</b>	<b>IBM 5154</b>
Dot Pitch	.28 mm	.31 mm
Sugg. Retail Price	\$785	\$849
Tinted Black Matrix Tube	Yes	No
Warranty	1 Year	90 Days

Ideal for most computing applications, the HX-12E offers 64 high-resolution colors and easy-to-read text. It gives you sharp colors, crisp characters...for less eye strain and easier viewing, hour after hour. Built-in versatility also allows you to display 16 colors with the IBM Color Graphics Adapter\* automatically.



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Princeton HX-12



IBM 5153

COMPARE:	Princeton HX-12	IBM 5153
Dot Pitch	.31 mm	.43 mm
Nonglare Screen	Yes	No
Warranty	1 Year	90 Days

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\* Or equivalents

\*\* When used with IBM Color Graphics Adapter or equivalent

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## ■ PUTTING IT ON FILM

NTSC (National Television Standards Committee) color. The Palette, therefore, requires the composite output of an IBM Color Graphics Adapter. It is not currently compatible with the IBM Enhanced Graphics Adapter.

Even as a screen camera, the Palette does not capture an image in real time. Its software—a memory-resident, color frame-grabbing program—can capture the most fleeting images and can be invoked at any time with the proper user-defined keystrokes, much like *SideKick*. You can capture both text and graphics screens. The frame-grabbing software evidently cannot determine which graphic mode is active, however, and you step through various settings to determine which looks best before it commits the image to disk. You can capture several images in a single session and store them in separate files.

Once all the images you want are on-disk, another menu-driven Polaroid pro-

### ■ The Palette has become the standard by which PC-based imaging devices are judged.

gram converts the disk information into the proper commands for the Palette. Multiple images can be sent in succession; the Palette properly exposes each one, advances the film, and exposes the next. The process is relatively quick (30 to 40 seconds per image) and quite easy to master.

The total range of the Palette is 72 colors, available as 9 shades of 8 colors. When you use the *Psaver* image-capture software, only 4 colors mapped from the

72 can be present in a given image. Other software with a driver written for the Palette can use up to 64 colors per image.

Polaroid claims a resolution of 640 by 400, a software rather than hardware limit. No noticeable image distortion was present; aspect ratio was a perfect match for the PC screen.

## COLOR DIGITAL IMAGER IV

The Color Digital Imager IV is offered not just as a film recorder but as a complete image-making system. Its software, *Graphic Express*, is a powerful chart-generating program based on Xenographics' *Mirage*. A powerful, if somewhat unfriendly, business presentation graphics program. Bell and Howell, however, has modified the user interface somewhat (although not enough) and improved the documentation (but again, not enough).

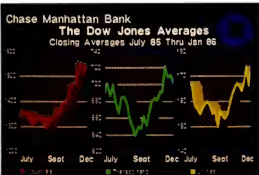
Once you master the ins and outs of *Graphic Express*'s complex structure, you'll be able to make colorful and detailed charts very quickly with it. Casual users might find it overwhelming, but it would probably prove very useful if put to constant use by a graphics department.

The CDI-IV also understands a subset of Hewlett-Packard Graphics Language and can be driven by 1-2-3 as if it were an HP 7475A plotter.

Also available from Bell and Howell is

*The Polaroid Palette is the powerful engine around which several other imaging devices are built. The Palette is a simple box with a sturdy front panel on which you can mount either an instant-film Polaroid back or a 35mm camera like the Minolta XG/A shown here.*

*The Palette captures images using Psaver software, a memory-resident, frame-grabbing program. Once your images are on disk, another program converts the data into commands for the Palette. The resulting images, while they can't match the output of a high-end system like the QVP-PC, are sharp, colorful, and well resolved.*



## FACT FILE

### Color Digital Imager IV

Bell and Howell  
411 Anapola Ave.  
Torrance, CA 90501  
(213) 320-5700

List Price: \$5,500; monitor, \$1,800

Requires: 320K RAM for *Graphic Express*, serial port. Math coprocessor recommended.

**In Short:** A complex but powerful system, the CDI-IV is hard to master but will reward you for your efforts. Its previewing capabilities and ability to understand a subset of Hewlett-Packard Graphics Language are particularly outstanding features.

CIRCLE 88 ON READER SERVICE CARD

a memory-resident screen-capturing program that can make the CDI-IV mimic the operation of a screen camera but with improved quality. The program, called *Slide-Port*, works within other applications and features advanced image-manipulation functions such as the ability to eliminate jaggies, alter colors, and change type styles.

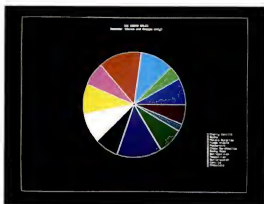
The CDI-IV hardware is based on a Polaroid Palette film recorder. Unlike other systems that unabashedly supply the Palette almost in its standard factory dress, Bell and Howell buries the basic mechanism in a more sophisticated package with additional imaging and control electronics. The system also includes a small metal box into which you can slide from one to four font cartridges. This box, which plugs into the main CDI-IV unit by a ribbon cable, tends to clutter the workspace.

The review system included a Minolta X-370 35mm camera (complete with motor drive) that mounts to the central unit as it would to a normal Palette. A smoked-plastic dustcover fits over the camera and gives a finished look to the system as well as protecting the camera and its mounting from bumps and jars. A 3¼- by 4¼-inch Polaroid film pack back can also be used.

Bell and Howell also supplied me with an optional Mitsubishi model 3419 CLPR very-high-resolution 13-inch color preview monitor with display capabilities that closely match the imaging capabilities of the Palette—and make the IBM Enhanced Graphics system look like warmed-over dog food. (A 19-inch monitor is also available.) Unlike the other higher-resolution systems reviewed here, the Bell and Howell is thus able to show you a good idea of what the finished graphics will look like. If your applications include complex graphics, you'll find that feature a blessing.

Unlike the *Graphic Express* manuals, the setup and installation instructions for the CDI-IV hardware were the most organized and understandable of the equipment tested here.

The CDI-IV central unit's hardware controls include several push buttons and three thumb-wheel switches. One thumb wheel inside the plastic dustcover on the rear of the unit allows you to select the film type you want to use and automatically adjusts the exposure time and filtering to best



*The Bell and Howell Color Digital Imager IV embellishes the Polaroid Palette film recorder engine with additional imaging and control electronics. A small metal box that holds font cartridges plugs into the main unit. User controls let you select the type of film, exposure time, and filtering you want; control the serial port; and select the number of copies made. Here, the CDI-IV sits atop the optional Mitsubishi high-resolution monitor offered with the system for previewing output. Bell and Howell's Graphic Express software generates complex charts. Another program, Slide Port, lets the CDI-IV act like a screen camera with improved quality.*



## ■ PUTTING IT ON FILM

suit that film; another thumb wheel on the rear of the unit controls the serial port parameters; and the third, on the front panel, selects the number of copies made of each image in manual mode (from one to seven). Push-button switches control on/off, reset, and expose.

The CDI-IV communicates with its host computer through a standard serial communications port. A special diagnostic program is supplied to help get the serial connection working, but the program proved unhelpful, actually giving spurious information.

Resolution of the CDI-IV system is rated at 832 by 630, and the images we produced bore out this quality. No geometric distortion was evident, and circular images were rendered perfectly circular.

## LASERGRAPHICS MPS-2000

The Lasergraphics MPS-2000 (MPS stands for Management Presentation System) is a two-piece system: one part, a modified Polaroid Palette, does the actual imaging; the other part is a proprietary image processor called the Lasergraphics Digital Controller with Full-Function Control Panel.

About the size of a PC system unit, the Lasergraphics Digital Controller is a rasterizing computer that converts the vector-based commands of graphic languages into the raster scan signals that the Palette uses. The Full-Function Control Panel consists of seven front-panel membrane switches and 14 LEDs that allow you some control over image processing and exposure. DIP switches on the rear of the Digital Controller allow you to select film-type and serial-communications parameters.

With most software, the Full-Function Control Panel seems superfluous. The MPS-2000 operates almost automatically without any user intervention. Only the indicator lights are necessary; I discovered that the MPS-2000 would seem to accept a second image while recording a first, but it would inevitably fail to process the second signal.

The Digital Controller is the MPS-2000 system's best recommendation. One feature (which admittedly requires a whole

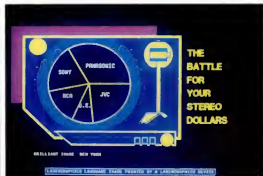
computer) makes the MPS-2000 among the most compatible of film recorders: in addition to its own Lasergraphics Language, it can understand Hewlett-Packard Graphic Language. Any software that you can connect to a Hewlett-Packard or compatible plotter will make images on the Lasergraphics MPS-2000. Like a plotter, the MPS-2000 communicates with its host computer through a serial port.

Of course, a plotter would be less expensive to connect than a film recorder, but the Lasergraphics MPS-2000 offers important advantages over plotters. If you're working on a presentation, the MPS-2000 will save you the additional step of photographing plotter output. It can also save you substantial time: after the image conversion, plotting a transparency will take only about a minute.

The biggest benefit of using the MPS-2000 rather than a plotter, however, is quality. Jaggies are hardly visible in the transparencies it generates. The colors are more saturated, various, richer, and brighter than ink could possibly be. Although Lasergraphics claims a palette of 1 million colors for the MPS-2000 system, the actual number of usable colors is determined by software and is apt to be several orders of magnitude fewer.

One immense aid in reducing the jaggies is the image addressability of the MPS-2000, rated at 2,048 by 1,366 pixels, which exceeds the resolution of the Palette recorder. The width of the electron beam in the Palette can thus mask the digital remnants in the on-film images.

You can configure the MPS-2000 system in several ways. The image processor



*The Lasergraphics MPS-2000's modified Polaroid Palette is perched here atop the Lasergraphics Digital Controller with Full Function Control Panel. The Palette takes charge of capturing images, and the Digital Controller processes them. The Full Function Control Panel's multiple switches let you control image processing if you want, but only the indicator lights proved essential.*

*The MPS-2000's images are crisp and colorful, showing only the subtlest evidence of geometric distortion. The system's high image addressability (2,048 by 1,366 pixels) helps mask the rough digital remnants called jaggies.*



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can be supplied to work solely with Lasergraphics' own language or Hewlett-Packard Graphics Language or both. In addition, it has three memory options: 256K bytes, 512K, and 1 megabyte. The more memory, the more polygon or vector vertices it can process per image, hence the more detail and refinement it can add. Each 256K of memory is sufficient for about 55,000 polygon or vector vertices. According to Lasergraphics, only 256K is necessary for most PC-based graphics. Mainframe graphics packages require the megabyte.

The weakest part of the Lasergraphics system proved to be the 35mm camera provided with the modified Palette engine. The black camera chassis bears no resemblance to any commercial camera I've seen; it appears to be custom-designed for applications like film recording. It offers no exposure or shutter adjustments, threads itself semi-automatically (you just pull the leader from the film canister and snap it into the camera), and automatically advances the film using a built-in motor drive. A switch on the bottom of the chassis rewinds the film—none too reliably. I discovered after ruining several rolls of film. The defect may be specific to the sample unit I reviewed. A film pack adapter for 3 1/4- by 4 1/4-inch Polaroid film is also included with the MPS-2000.

The quality of the images produced with the MPS-2000 was very good, with just a slight amount of geometric distortion: the right side of the rectangular image

area was slightly shorter than the left. The problem was minor enough to be unnoticeable in circular images or away from the very edge of the image.

## MATRIX QVP-PC AND MATRIX PCR

The most expensive and elaborate film recorder reviewed here, the Matrix QVP-PC/Matrix PCR combination also gives the highest-quality image. Its rated resolution of 4,096 lines is near the limit of the 35mm film that it records upon. You can also select a lower 2,048-line resolution mode; although its images are not as sharp, the lower resolution mode requires one-quarter the image-processing time of the high-resolution mode.

The system consists of two parts: the QVP-PC and the PCR. The PCR is the film recorder itself, consisting of a video display system based on a high-resolution, 7-inch, flat-faced monochrome display tube, color filters, the lenses necessary for forming the image on film, and a permanently attached 35mm Contax camera, packed into a compact floor-standing unit about the size of a PC system unit on end.

The QVP-PC is an image processor on an expansion card that fits into any full-length slot in a PC, XT, or AT. Based on a Motorola 68000-series microprocessor, it is essentially a microcomputer unto itself, dedicated to rasterizing images described by sets of two-dimensional objects.

Besides driving the PCR film recorder, the QVP-PC can—using the same software drivers—operate Diablo C-150 or Tektronix 4695 color ink-jet printers, the Matrix TT200 thermal transfer printer, a Tecmar Graphics Master high-resolution video display adapter, and other devices.

Although resident in its host computer, the QVP-PC functions as an entirely separate device. It understands only its own language—cleverly named Matrix SCODL (Scan Conversion Object Description Language)—and works entirely independently from the host PC's microprocessor. It is compatible only with software that generates SCODL code. It communicates to the PCR using its own GPIB (general-purpose interface bus) cable.

The QVP-PC does more than just con-

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The hardware, a short add-on board, contains three video digital-to-analog converters for each of the R, G and B guns and a color look-up table with a capacity of 64 colors, each defined as 6 bits of red, 6 bits of green and 6 bits of blue.

The software is a short RAM resident program which allows for a suspension of your program. The keyboard is used to control the contribution of red, green or blue in a continuous and gradual manner or stepwise. Simple easy to remember key strokes are used to save or to recall color palettes and return to continue your program.

For a limited time (until July 1986) the price is still \$395.

**DISCORTEX Corp.**  
368 Veterans Memorial Highway  
Commack, New York 11725  
(516) 664-9696



## FACT FILE

### Lasergraphics MPS-2000

Lasergraphics Inc.  
1761 Cowan Ave.  
Irvine, CA 92714  
(714) 660-9497

**List Price:** \$6,995 with 35mm camera and film pack camera backs, one language (Lasergraphics or HPGL), and 256K RAM  
**Requires:** Serial port.

**In Short:** The MPS-2000's ability to understand the Hewlett-Packard Graphics Language makes it compatible with a wide array of software. In the high-quality transparencies it generates, jaggies are hardly visible.

CIRCLE 666 ON READER SERVICE CARD



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CIRCLE 141 ON READER SERVICE CARD

## ■ PUTTING IT ON FILM

vert the signal of the host PC's data bus into something the PCR can understand. It handles the necessary calculations for drawing the image most elegantly and speedily. For instance, it skips the areas of an image that would display black on the film, and it omits unnecessary scanning of individual colors. Even so, a complex, high-resolution image may take several minutes or more to record.

As with any computer, the control software for the QVP-PC must be loaded whenever you turn the system on. Matrix maintains flexibility by not encoding this software as firmware in ROM. You can easily modify the driver software to change system parameters, such as the color palette mapping of its 256 available colors and even display resolution.

The QVP-PC has its own on-board endowment of RAM that it uses, as necessary, for image processing. It also uses a chunk of system memory of a size you specify. It assigns any unused memory as a buffer to queue the images sent from the host system. If the QVP-PC runs out of solid-state memory, it can fortify itself with "virtual" memory by swapping data out to disk. Thus, several images can be lined up for printing while you have a coffee break or three-martini lunch.

The QVP-PC control software can either work in the foreground and display progress (and problem) messages on the host computer's screen as it makes pictures, or it can run in the background so that you can continue to design and edit



## FACT FILE

### Matrix QVP-PC

#### Matrix PCR

Matrix Instruments Inc.

1 Ramland Rd.

Orangeburg, NY 10962

(914) 365-0190

List Price: QVP-PC, \$2,195; PCR, \$11,795

Requires: 512K RAM.

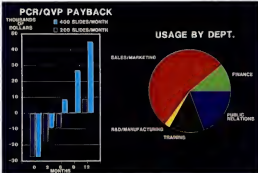
**In Short:** The combination of the QVP-PC board and the PCR film recorder incorporates some state-of-the-art techniques to achieve excellent output. This top-of-the-line system is elegant and flexible.

CIRCLE 144 ON READER SERVICE CARD

## ■ PUTTING IT ON FILM

Packed into the **Matrix PCR** film recorder are a 7-inch monochrome display, color filters, lenses, and a 35mm camera. Not shown here is the **Matrix QVP-PC**, an image processor on a board that plugs into a PC expansion slot. The **QVP-PC** and **PCR** are both intelligent devices that control their functions through their own microprocessors.

The **Matrix** system is expensive and complex, but it will reward you with excellent images such as the example shown here. The slides it generates show no sign of geometric distortion.



images on the host computer while previous images are being printed.

The **PCR** also has its own microprocessor. Operation of the recorder is controlled by push buttons on a raised control panel; a two-segment LED display shows the current function. In actual operation, almost all of the **PCR**'s functions are controlled by the **QVP-PC**. You just press its reset button when you load the film.

The **PCR** is quite intelligent. Not only does it automatically advance film upon loading but it also calibrates itself—not just at turn-on time but before imaging the next slide after 15 minutes have elapsed or five exposures have been made—assuring consistent quality.

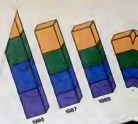
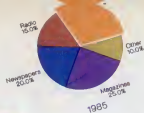
The quality of the **QVP-PC/PCR**'s images is beyond reproach. I observed no geometric distortion in my test shots. On-film resolution was the highest of any device tested, near the limit of the film itself.

**COMPLEXITY AND UTILITY** Unlike many PC peripherals, screen cameras and film recorders are not mere add-ons—they are often more sophisticated than the PC itself. Like any complex system, you cannot expect to plug one in and instantly get beautiful images. Installing and getting effective results from a film recorder is as much art as technology. The system can be complex to set up and master, both from a hardware and software standpoint.

But if you need the services they offer, screen cameras and film recorders can be invaluable tools, well worth the time it takes to master them. They can create impact-generating images that compare with—and even top—the quality of the work of a graphic artist. When you compare their cost to the cost of custom-made commercial art, they pay for themselves in a few months.

Although their color spectra are much more limited than the million or so shades the artist can manipulate, these devices all create bold, pure colors with a wide enough variety to fill any presentation. The quality of their output is high enough to fulfill the primary purpose of any graphic communication medium: you notice the message rather than the presentation. □

Winn L. Rosch is a contributing editor of *PC Magazine*.



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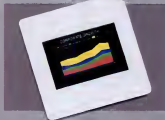
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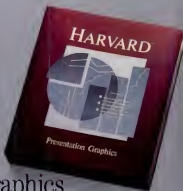
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# SHAREWARE: NOMINAL FEES CAN YIELD BIG VALUE

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There is another way to choose software. It flies in the face of traditional marketing, classical economics, and common sense—but it works. Shareware, also known as user-supported software and freeware, employs a unique marketing strategy with a disarmingly simple concept: use the software before you decide to buy it.

*Just because a program's free doesn't mean it lacks value. Those in the know have been downloading useful business-oriented shareware since PC-Talk caught on in 1983.*

## ■ SHAREWARE

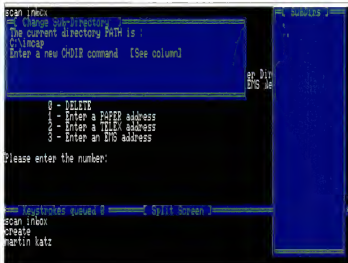
Unlike commercial software, with its complex copy-protection techniques, agreements, warnings, and "as is" clauses, shareware makes only one demand: you must not sell copies for profit. You are, however, encouraged to make copies and pass them on to friends for free. Each free copy is not a limited demo but a working version that you can put through its paces for as long as you like. There's no time limit built into the software or an obligation to return it if you don't like it. If you decide to use the software, you are asked, on the honor system, to send the author a modest fee (usually less than \$50).

Shareware is different from public-domain programs, which are free but do not have formal support. When you send your fee to a shareware author, you become a registered user and usually qualify for telephone support. Some authors offer other incentives to register, such as typeset manuals, free updates, newsletters, or a commission for registering other users.

**STILL IN INFANCY** Shareware has been around almost as long as the PC. Early in 1983, Andrew Fluegelman, a founding editor of *PC Magazine*, introduced *PC-Talk*, a communications program that became the first shareware success story. Software reviewers compared it favorably with more-expensive commercial programs, and over time *PC-Talk* (the current version is *PC-Talk III*) has achieved a kind of cult status, particularly on bulletin boards, where users often post free utilities called merge files they've written to enhance the program. A number of versions are available, including one called the *Executive* (*PCT366*) and another for the *PCjr* (*Talkjr*). (For more on *PC-Talk III* merge files, see "The Urge to Merge," *PC Magazine*, Volume 4 Number 5.)

*PC-Talk III*'s success encouraged other programmers to try the shareware approach. *PC-File III*, a database written by Jim Button, may be the most popular shareware program ever written, with an estimated 250,000 users. The program has been so successful that Jim Button's company, Buttonware, now advertises a commercial version called *PC-File/R*.

*PC-Write*, a word processor distributed by Quicksoft, also has a large following, including a number of corporate accounts.



Omodem's split-screen option lets you monitor the commands you type and the host's responses. You can also adjust window positions so that you can still see what's going on while executing a command. To download a file into a different subdirectory, you can invoke subdirectory windows, which can also be used to choose and change subdirectories.

Author Bob Wallace has sold over 40,000 disks by mail and has over 7,000 registered users, but this represents only the known user base. Quicksoft offers a \$25 commission to registered users who get their friends to register.

These three programs represent the best-known portion of the shareware marketplace—but only a small portion. If you spend any time looking over bulletin boards, you already know that shareware, like its rich commercial software cousin, ranges from simple utilities to complex task-switching programs. Their high quality is remarkable, especially when you consider that the programs were written by individuals, not by a team of developers.

Most shareware runs on the IBM PC AT as well as the PC, XT, and compatibles, but you should test the individual programs on your machine to be sure. Unless otherwise noted, shareware products include documentation on-disk for local printing (one program even has a tutorial). Shareware programs are available from public bulletin boards, user groups, friends, or authors themselves (see side-

bar, "Where to Get Shareware"). If you try any of these programs, you'll discover that shareware is serious software that deserves the attention of business users.

**COMMUNICATIONS** *PC-Talk III* faces some stiff competition in the communications shareware market. One of the contenders is *ProComm*, Version 2.0, which offers several terminal-emulation modes, including IBM-3101, DEC VT-52/100, ADM-3, and ANSI. File-transfer protocols include Xmodem, ASCII, and Kermit, and there's a script processor for unattended communications. You can also suspend communications and exit to DOS.

If you need VT100/102 terminal emulation, you should try *PC-VT*, Version 8.4, one of the better terminal-specific emulators I've seen. *PC-VT* mimics all VT100/102 functions and makes good use of the PC's function keys. File-transfer protocols include ASCII and Kermit, and, as with *ProComm*, you can suspend communications and exit to DOS.

To date, my overwhelming favorite is *Xmodem*, written by John Friel III of The

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## ■ SHAREWARE

Forbin Project group. I've used *Qmodem*, Version 1.09, but a new version has just been posted on my local bulletin board (Version 1.13). *Qmodem* duplicates the mnemonic Alt key and numeric keypad sequences used in *PC-Talk III*, so users can make a smooth transition.

You can customize almost every aspect of *Qmodem*, including communications parameters, window colors, window placement, logged drive (with a directory and pathname), and even CPU speed (although I couldn't change mine. PC AT users may find this a bonus). The dialing directory stores 100 numbers with communications parameters. You can also define dialing prefixes for long-distance services or PBX phone systems. *Qmodem* can store 10 different numbers from the directory, each with its own prefix, and auto-dial one after another until a connection is made. There's also a redial command for single numbers.

*Qmodem* has a DOS command shell that lets you suspend communications at any time and return to DOS. Once the A> prompt appears, you can run another program or use DOS to perform commands such as COPY, FORMAT, and VERIFY. To recall communications at any time, type EXIT. *Qmodem* will then leave DOS and the main screen will reappear.

*Qmodem's* file-transfer protocols include ASCII and two versions of Xmodem (Checksum and CRC). The directory command displays not only filenames but also the transmission time based on the current bit-per-second rate. *Qmodem* also has a command that displays both subdirectories and paths for the current drive; you can enter a new subdirectory and path, or any other CHDIR command, for downloading and uploading files. *Qmodem's* ASCII file view lets you use wildcards for filenames; you can choose either the DOS TYPE command or *Qmodem's* own screen-by-screen view, or you can specify your own viewing program.

**UTILITIES** Utilities make up the bulk of shareware. Several stand out from the crowd. *Newkey*, written by Frank A. Bell, has been reviewed alongside RoseSoft's *ProKey* and Borland International's *SuperKey* (see "Power Plays at Your Keyboard," *PC Magazine*, Volume 4 Number

22). File-maintenance utilities are popular, and PC-SWEEP, written by Sandi and Shane Stump, is one of the best. [This is not the same program as the commercially available PC Sweep from Koch Software Industries, reviewed in "Extending DOS's Utility," in this issue—Ed.] PC-SWEEP offers a menu-driven extension of DOS file utilities to copy, rename, backup, and list ASCII files.

Menu programs are another shareware specialty, and *AutoMenu*, by Marshall W. Magee, is one of the best. *AutoMenu* lets you create a user interface with batch commands and menu entries that is particularly useful on hard disks. Another interesting shareware utility is *BAT204A*, or *Extended Batch Language*, which lets you define 15 variables and use BASIC-like GOTOs and GOSUBs in batch programs.

My favorite shareware utility, however, is *DOSaMATIC*, written by Steve Mykytin of Marin Pacific Software. One of the best examples of quality shareware available, *DOSaMATIC* is a task-switching utility that lets you load several programs and move among them with a sim-

plc Alt-key sequence.

When you load *DOSaMATIC*, a menu appears with available drives, directories, and a list of files for the current drive. The menu also displays volume name, memory, DOS version number, and any current tasks. The file utilities would make an excellent program all by themselves: you can copy, debug, delete (with confirmation), edit, print, rename, search, sort, or view files on any drive.

*DOSaMATIC's* most powerful feature is its ability to run several programs in memory. You select an application from the menu and specify the command name, memory size, and whether it is a graphics program. *DOSaMATIC* then loads the application. Once it is loaded, you can suspend the application with a user-definable Alt-key sequence that recalls the *DOSaMATIC* menu (Mykytin took great pains to avoid using the same low-level BIOS interrupts as *SideKick* and other memory-resident programs use). You repeat this procedure for each application.

This kind of task-switching has some advantages over windowing programs like

DOSaMATIC's main menu displays all the information you need to manipulate files. After you select a file and press Return, the File Menu panel (at right) appears with a listing of the available options. The Execute command loads a program into memory for task switching. Pressing Alt-F10 recalls the main menu, from which you can load other programs.



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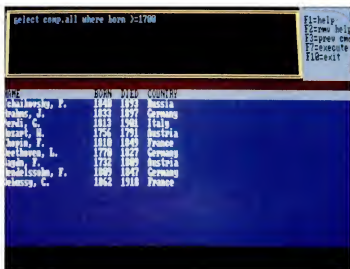
## ■ SHAREWARE

IBM's *TopView*, Quarterdeck's *DESQview*, and Microsoft's *Windows*. *DOSaMATIC* does not need expanded memory, a new graphic board, or even a hard disk—I ran three tasks under *DOSaMATIC* with two floppy drives on a PC with 640K bytes of RAM. Since *DOSaMATIC* switches tasks instead of creating and manipulating windows, programs do not have to be "well behaved." The only exception to this rule are programs that trap keyboard interrupts, like *XyQuest*'s *XyWrite*. The documentation lists several programs that have been tested, including *I-2-3*, *Microsoft Word*, and *WordStar*; two programs that do not work are *Smartcom* and the *Leading Edge Word Processor*. I ran several shareware programs in *DOSaMATIC* (*Qmodem*, *PC-DeskTeam*, and *PC-Write*) and some commercial programs (*I-2-3* and *Perfect Writer*) and had no problems with any of them.

*DOSaMATIC* does not perform multitasking like *DESQview* or *Microsoft Windows*, but for users who have limited hardware resources or run only a few applications that don't require multitasking, *DOSaMATIC* deserves careful attention.

Another notable shareware utility is *PC-DeskTeam*, a pop-up desktop utility written by Frank Milano of Alternative Decision Software. *PC-DeskTeam* was formerly called *PC-Deskmate*, and on most bulletin boards you'll still find it under that name. The program includes an alarm clock, calendar, calculator, DOS utilities, notepad, phone dialer, printer controller software, and a typewriter emulator. An installation program lets you define the controller's printer escape sequences and the Alt key sequence you want to use for the "hot key" to call *PC-DeskTeam*. You can save these configurations to a default file or enter alternative filenames that can be recalled when you run *PC-DeskTeam*.

The main window displays eight utilities that you can call up by pressing F2 through F8. Pressing F1 while running a utility recalls the main window; pressing Esc returns you to the interrupted program. F10 calls the configuration window, in which you recall configuration files and set window colors. All *PC-DeskTeam* utilities take advantage of the function keys, which



The PC-DBMS tutorial walks you through most of the program's highlights. After opening the sample database, *Music*, you can select all composers, or you can set up a conditional clause to be more specific. The command window at the top of the screen shows the syntax you would use to select all composers born after the year 1700.

makes them very easy to use.

The alarm clock utility includes a clock display and chime switch, but its nicest feature is the alarm. When the alarm goes off, the program can execute single-line commands or batch file or display a message (the default is "Time for bed!"). The

## ■ For users with limited hardware resources, *DOSaMATIC* deserves careful attention.

calendar window lets you maintain a list of appointments, while the phone window lets you dial phone numbers on Hayes-compatible modems for voice communications. Both of these windows let you edit, print, save, or recall any number of files with .PAD extensions. *PC-DeskTeam* also has a full-function calculator

that can read input from the screen and copy results into a program. There's even a "paper tape" feature that lets you toggle the printer as you work.

One of the nicer features is a DOS utility window with the CHKDSK, CHDIR, COPY, DIR, ERASE, PRINT, REN, NAME, and TYPE commands (unfortunately there's no FORMAT command, one of the program's few shortcomings). The CHDIR command lets you specify both the default drive and subdirectory for DOS or for *PC-DeskTeam*'s utility files like CALENDAR.PAD.

*PC-DeskTeam* does a great job of printer support. You can select up to four different print modes (double-wide, condensed, enhanced, or emphasized), which is a real boon if you run applications programs that have little or no printer support. *PC-DeskTeam* can switch printer ports (LPT1 and LPT2) and recall specific configuration files for various printers. There's even a Print Screen toggle that will disable the PrtSc key. The "typewriter" window is another handy feature (I have seen standalone typewriter emulation programs ad-

vertised for the price of registering *PC-DeskTeam*). The typewriter offers two modes: line and character. The line mode allows single-line editing before printing, while the character mode prints as you type. You can set and change tabs and left and right margins. Depending on the printer port selected, you can use a dot matrix or letter quality printer.

*PC-DeskTeam* lacks the power of some commercial desktop utilities; on the other hand, it is not overburdened with commands that have limited use for a limited audience, and while it may not be the desktop utility for power users, it is definitely a contender for the rest of us.

**DATABASE MANAGERS** *PC-File III* has set a standard for shareware database managers that is hard to beat—so hard, in fact, that there are not many shareware databases around. Paul Korbin's *PC-DBMS*, a significant new entry in this field, offers a relational capability that *PC-File III* lacks and is extraordinarily compact (only 73K bytes is required).

The *PC-DBMS* main screen is divided into three areas: a command-line window, two lines for messages and headings, and an output window. Help is available in the output window for all commands, and, once you're familiar with the program, you can turn the help off. *PC-DBMS* comes with its own tutorial files, and the first part of the manual walks you through a sample session.

You define *PC-DBMS* databases using three file types. Definition (.DEF) files contain the database structure. These files must reside on the logged drive with *PC-DBMS*. A database can have one or more ASCII data files (.DAT), each with a corresponding index file (.INF). Data and index files must have the same filename, but they do not have to match the .DEF filename. One database can thus have a number of associated data files. Since data files are in ASCII tables, importing and exporting data is relatively easy.

You can edit any command line or recall previous command lines for editing before pressing the execute key (F7). *PC-DBMS* has a number of standard commands (OPEN, DEFINE, DISPLAY, SHOW, and EXIT), but it really displays its horsepower in the relational command

SELECT. You can use SELECT to show the entire contents of a data file, but when you combine it with the WHERE clause, you can display and manipulate records using mathematical operands such as equal

to (=), greater than (>), less than (<), greater than or equal to (>=), and less than or equal to (<=). SELECT commands can contain up to ten comparisons linked by ANDs and ORs. A NOT clause

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You can get *PC-File/R*, as well as the rest of Jim Button's programs, from computer dealers all over the United States. Or call 1-800-JBUTTON to order directly from ButtonWare.

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## ■ SHAREWARE

### DOWNLOADING TIPS

*Downloading software from a bulletin board sometimes involves a few tricks and special utilities.*

Shareware is available on public-access bulletin boards and on subscription networks like The Source and CompuServe. If you plan to download shareware, you will need a few extra utilities to get the job done.

Most shareware programs include a number of installation, configuration, and documentation files. Instead of listing each file separately, most bulletin boards group them all in one large file with an .ARC (archive) extension. Most programs you will download are in .ARC format, so you need an archive utility to extract the constituent files before you can use them. Almost any bulletin board on which you can find shareware will also contain a utility called ARC.COM (depending on the bulletin board, it may also have a version number—for example, ARC450.COM).

Instructions for using ARC are displayed when you enter ARC by itself on the command line. Typically you'll want to extract files from ARC format to full file format. You can extract all the files with a single command, or, if the archive is large, one at a time. ARC has a lot of other functions: you can use it to run files while in archive format, view or print files, or create your own archives. An archive file takes up less space than its constituents, so it takes less time to send an archive file, which is a big advantage if

you upload as well as download. Archive files are also useful for storing a number of backups on disk.

LAR.EXE and LU86.EXE are similar utilities for extracting and listing files in a library (.LBR) format. Although ARC has become the format of choice, you should have a copy of a library utility just in case the program you want is available only in a library format.

Sometimes files in an archive or library format are "squeezed," or compressed to take up less space. Typically a squeezed file has a Q in its extension to alert you that it is in squeezed format (for example, squeezed .COM files have .COM extensions and squeezed .DOC files have .DOC extensions). Squeezed files will not run unless you unsqueeze them. One of the best utilities for this is a program called ALUSQ (All Purpose Unsqueeze), but if you can't find this one, use whatever is currently available on your bulletin board.

Public bulletin boards are often run on systems similar to your own, and even 10 megabytes of hard disk space can fill up pretty quickly. File archives and compression let system operators put more programs on their systems, and it only takes a few minutes to extract or unsqueeze working copies. You may even find these utilities useful on your own system.—Tom Stanton

lets you specify true/false statements, and you can nest clauses in parentheses to control the order of evaluations.

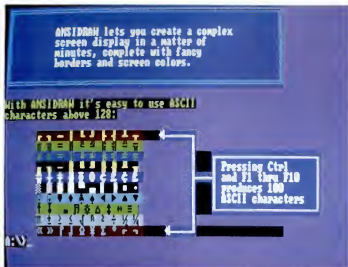
PC-DBMS is not as simple to use as PC-File III. Its documentation contains little information on importing and exporting data, and novices may find the command syntax threatening. However, if you have even a passing familiarity with dBASE II or III or any other relational database, you'll find PC-DBMS's potential exciting.

**MISCELLANEOUS MARVELS** The shareware concept may be most valuable

for the chance it gives you to sample off-beat programs. It's difficult to assign programs like *Syslog* and *ANSIdraw* to traditional software categories, and therefore they might easily be overlooked in the commercial marketplace. Unlike a word processor or communications package, you might never realize you need these programs until you try them. After you do, however, you may not be willing to get along without them.

*Syslog*, written by R.W. Cobb, is a great program for anyone who bills computer time by the hour or for users who





This screen was created with ANSIDraw in 15 minutes. In fact, it took more time to decide on the colors than to draw the screen. The upper panel shows a typical ANSIDraw application, while the lower portion displays all the available ASCII characters in a variety of colors.

must log computer activity for tax purposes. When you first run *Syslog*, you create a log file that stores the date, time in, time out, and a description of the activity. The log file must be stored on the same disk as *Syslog*.

You can run *Syslog* by itself, but it is most useful when placed in a batch program, where it can prompt you for log information before you start to run an application. If you have a clock on your PC, *Syslog* reads the time into the log file automatically; otherwise you must enter it from the keyboard. *Syslog*'s only shortcoming is that it does not prompt you automatically for log information at the end of an application; you have to remember to log out.

Most batch-file menus are little more than a few lines on the screen with various selections. This bare-bones approach may be fine for personal use, but if you are trying to insulate other users from DOS, you would probably like a more decorative menu, particularly on color screens. The solution is *ANSIdraw*, a shareware utility written by Amrich Enterprises that helps you create ANSI graphic screens. Once you get to know *ANSIdraw*, you can create

elaborate color screen displays with reverse or blinking characters, all with very little effort.

You must first install ANSI.SYS by adding the command `DEVICE=\\ANSI.SYS` to your CONFIG.SYS file. *ANSI-*

■ One question is inescapable: If the software is so good, why is the author giving it away?

*draw* and any associated ANSI.SYS screens require this driver. Once it's installed, you type *ANSIdraw* to start the program. The main menu displays the Shift-function key assignments, which include setting default colors, a block move option, load screen, save screen, two extra help screens, and the color menu.

Pressing any key displays the drawing screen. A status line on the bottom dis-

plays the available screen characters. You enter text from the keyboard and drawing characters from the function keypad. Pressing Ctrl-F1 changes the screen character set, which includes vertical and horizontal lines, corners, and junctions in single stroke, double stroke, and various combinations. *ANSIdraw* lets you manipulate almost any ASCII character over 128 as well as alphanumeric keys. The drawing-screen editor lets you position the characters using the cursor movement keys. You can also define and copy blocks of screen text.

Pressing Shift-F9 displays the color screen. There are 256 possibilities, including 64 colors, 64 reverse colors, 64 blinking colors, and 64 blinking reverse colors. Selecting a color here changes the drawing screen color automatically. Any characters entered on the screen are displayed using the selected color or attribute. You can assign colors or attributes at any time, even character by character if you like.

Screens can be saved in ASCII text format (with no color) or in ANSI.SYS format. Once a screen is saved, you can edit it again or use its contents as the basis of a new screen design. You can display either screen format using the TYPE command in batch files (the ANSI.SYS driver must be loaded if you want to display screens in color).

**WHY THEY DO IT** The shareware approach to marketing raises several questions, but one is inescapable: if the software is so good, why is the author giving it away? Part of the answer is purely economic: shareware is one of the few ways to test-market a program without investing a small fortune.

Steve Mykytin, a consultant who works primarily on mainframes, wrote *DOSa-MATIC* to gain some experience with the PC, and friends who tried the program suggested that he sell it commercially. "I had used *PC-Talk III* and liked it, so I decided to try shareware. It was a good decision," he reports. "Shareware is an economical way to gain visibility with a sophisticated audience. I've gotten a lot of good reaction from the people who downloaded it from CompuServe or bulletin boards. Shareware users are a tough audience, and they've offered a number of sug-

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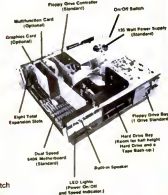
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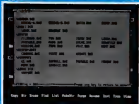


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Find any file on hard disk	Yes	Yes	Yes	Yes	Yes	Yes
Copy files or entire disk	Yes	Yes	Yes	Yes	Yes	Yes
Search for files on disk	Yes	Yes	Yes	Yes	Yes	Yes
Change file attributes	Yes	Yes	Yes	Yes	Yes	Yes
Change file subdirectory	Yes	Yes	Yes	Yes	Yes	Yes
Copy new subdirectory	Yes	Yes	Yes	Yes	Yes	Yes
Change file name	Yes	Yes	Yes	Yes	Yes	Yes
Check free space on drive	Yes	Yes	Yes	Yes	Yes	Yes
Change file in ASCII format	Yes	Yes	Yes	Yes	Yes	Yes
Change file in MFC format	Yes	Yes	Yes	Yes	Yes	Yes
Check or set time and date	Yes	Yes	Yes	Yes	Yes	Yes
Save printer control codes	Yes	Yes	Yes	Yes	Yes	Yes
Save diskette printer	Yes	Yes	Yes	Yes	Yes	Yes
Password lock computer	Yes	Yes	Yes	Yes	Yes	Yes
On-line manual features	Yes	Yes	Yes	Yes	Yes	Yes
Cost	\$49.95	\$29.95	\$35	\$49.95	\$49.95	\$49.95

Money returned (The feature is available from another program).  
Note: StarDOS doesn't do WindowDOS does. They work together or perfect compatibility.  
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Software of the Future, Inc.  
P.O. Box 531630 Grand Prairie, Texas 75853

WindowDOS Interactive DOS Utility Program for IBM PC, XT, AT and compatible computers.  
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*Try your local bulletin board, user-group software library, or the authors themselves to get the shareware program of your choice.*

The most common method of acquiring shareware programs is to download them from local public-access bulletin boards or copy them from user-group libraries. If you aren't sure what's available in your area, talk to a salesperson at your local computer store or try a college or university in your area. (A continually updated list of bulletin boards is available on *PC Magazine's* Interactive Reader Service.)

If downloading by phone line is not

practical and you don't have a user group in your area to help you, contact The Boston Computer Society, one of the largest user groups in the nation. It offers a 100-page catalog of public-domain software for \$10 to nonmembers (\$7 for members). You can get a copy by sending a U.S. check or money order to The Boston Computer Society, Software Exchange, c/o Proteus Software, 363 The Great Road, Bedford, MA 01730. You can also call or write to the distributors of

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### Multipath Inc.

P.O. Box 395  
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### Pink Panther Data Systems

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(619) 941-0925

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### Soft-Plus Research

P.O. Box 590  
Boonville, CA 95415  
(707) 895-2210

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### ANSIdraw, Version 2.2

Amnch Enterprises  
7739 N. Whitier Place  
Indianapolis, IN 46250

Suggested Contribution: \$20

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### AutoMenu, Version 2.0

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6577 Peachtree Industrial Blvd.  
Norcross, GA 30092-3796

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### DOSaMATIC, Version 2.06

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1001 Bridgeway, #514  
Sausalito, CA 94965

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### Extended Batch Language,

Version 2.04

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Delray Beach, FL 33444

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Birmingham, MI 48010

Suggested Contribution: \$30

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Paul Kobran  
Kware  
P.O. Box 16206  
Arlington, VA 22215

Pricing: disk, \$10; disk and documentation, \$18; registration, \$35

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### PC-DeskTeam, Version 2.0

Alternative Decision Software Inc.  
P.O. Box 307  
Lancaster, NY 14086

Suggested Contribution: \$25 plus shipping

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### PC-File/R

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Sandi and Shane Stump  
P.O. Box 13719  
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### PC-Talk III, Version 3.66

The Headland Press  
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Seattle, WA 98109

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### ProComm, Version 2.0

PL Software Systems  
P.O. Box 1471  
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### Umodem, Version 1.09

The Furber Project  
John Fried III  
715 Walnut St.  
Cedar Falls, IA 50613

Suggested Contribution: \$25

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### Sylog

R.W. Cobb  
Apex Resources  
23 Christine Ct.  
Stormville, NY 12582

Suggested Contribution: \$39.95

CIRCLE 627 ON READER SERVICE CARD

We'll have to delay the announcement of your team's new software package a few days, due to the Promotion department's problems coordinating press coverage. You and I should get together with Nancy and Mark from Promotion to discuss this. Can you make it at 3 p.m. tomorrow? Please let my secretary know.

PC-DeskTeam's typewriter is handy for accomplishing small tasks like addressing an envelope without the inconvenience of leaving a major project. Line-mode typewriting lets you edit lines before you print them. A ruler line keeps track of margins, and the column position is updated as you type. Note the PC-DeskTeam clock in the upper-right-hand corner.

gestions for improving the product."

Mykytin released a commercial version of *DOSaMATIC* (Version 3.0) in March 1986, based in part on the positive response of the product's shareware audience. "The shareware version's been profitable, but only because I didn't bet the

■ **Shareware is not "free" software. Authors depend on your contributions.**

company on it. I wouldn't use shareware to market a program strictly for profit. I would guess only about 1 to 5 percent of the users have actually registered."

Frank Milano, the MIS consultant who wrote *PC-DeskTeam*, had tried the commercial route with a pop-up calculator. "I took a small ad for 6 months and had some success, but *SideKick* had come out at the same time. There was no way I could compete," he says. When he finished develop-

ing *PC-DeskTeam*, he talked to Bob Wallace at Quicksoft and decided to try the shareware approach. "I decided on shareware for two reasons. First, there's no marketing cost involved. Secondly, we knew that a pop-up program like *PC-DeskTeam* or *SideKick* was bound to cause problems with other programs. With shareware, people can try it first, so they know what will happen up front."

One closing thought: shareware is not "free software." The authors submit programs for your approval, for free, but they depend on your contributions. If you keep a program, pay the registration fee. As often as not, you will get more in return, and even if you don't, your contribution will help the author to continue developing the product. If you think the author is foolish to trust you to pay, then the commercial marketplace has conditioned you well. Perhaps you deserve to be disappointed. If, however, you are tired of gambling on products with no recourse, the shareware effort deserves your support.

*Tom Stanton is a free-lance writer based in Manchester, New Hampshire.*

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# EXTENDING DOS'S UTILITY

*These usually inexpensive, handy hard disk utilities can be amazing little productivity boosters. But surprise! They're as different from one another as they are alike.*

If you ever lost a file within a maze of subdirectories, needed to access programs and overlays located in another directory, or wanted to back up only a specific group of files, you can appreciate the importance of hard disk utilities. And if you haven't yet found yourself in one of these situations, you probably will sooner or later. Decreasing hard disk costs and increasing installations of local area networks are multiplying the number of hard disk users, making utilities that ease the maintenance and manipulation of files more important.

Hard disk utilities fall into a number of categories, four of which are file backup utilities, path utilities, extended DOS services, and application menu generators. Each of the categories fulfills a specific shortcoming of DOS. File backup utilities have more options and generally operate more quickly than DOS's BACKUP command. Path utilities allow you to work more efficiently with programs such as *WordStar* that do not take

advantage of DOS's hierarchical structure. Menu generators enable you to shield other users from the enigmatic DOS prompt. And extended DOS services utilities do just that—extend the services DOS provides. While you can operate a hard disk without any of these utilities, life is so much easier and work so much more productive with them.

The extended DOS services and application menu generator programs are usually grouped under the broad category of file-management utilities. However, they do have different approaches and are geared toward different users. Menu generators are designed to shield you from raw DOS, while extended DOS services are intended for individuals who need more power than DOS can provide.

Over the coming months, *PC Magazine* will cover each category of hard disk utility; this article focuses on those programs that extend the basic DOS commands and provide you with the means of maintaining and manipulating your hard disk file structure.

Just how useful are these programs? A popular program called *XTREE* can copy every file with the extension \*.TXT in every subdirectory on the hard disk to another drive in nine keystrokes—including the filespec. With *DOS2ools*, you can keep your *WordStar* program files in their own subdirectory and access them from anywhere in three completely different ways. With *PathMinder* on a 256K-byte system, you still have



## ■ HARD DISK UTILITIES

252K bytes of RAM in which to run 1-2-3.

Virtually all of the utilities reviewed here contain the full range of traditional DOS commands and features. The only exceptions are those that provide individual tools for specific purposes, such as *ALPS User Tools* and *FilePaq*. Most of the programs include a few new commands and features that should have been included in DOS to begin with: commands such as Move and Find File and features such as a functional visual tree.

A few programs have added utilities that are not normally associated with DOS shells, for encoding and decoding files (*DOS2ools*, *FilePaq*, *PathMinder*), backing up and restoring large files or directories (*KeepTrack Plus*, *PC Sweep*), editing text (*Dirrec-Tree*, *PathMinder*), creating macros (*1dir*, *Dirrec-Tree*, *DOS2ools*), creating menus or adding to existing ones (*1dir*, *GASP!*, *PathMinder*), and undeleting a file (*PC Sweep*).

Certain features are essential in an extended DOS program: a functional visual tree for navigating through subdirectories and highlighting the destination of a command, a Move command, a Find File command, and a tag capability. A less crucial but very common feature is the ability to execute programs and batch files from within the shell.

Most of the programs reviewed here include a Move command. While a move's end result is similar to copying and then deleting or erasing a file in DOS, Move differs in that it can only be performed on directories within the same disk; that is, you cannot move a file from drive X: to drive Y:. Performing a move changes the file's entry in the file allocation table rather than duplicating its content in a different physical location. As a result, moving a 1-megabyte file takes as long as moving a 1-K-byte file.

Tagging files enables you to manipulate files en masse. Without this capability, you can perform operations only on groups of files with related names for which you can use wild cards. Tagging lets you mark unrelated files simply by highlighting them or entering a command. The mechanics differ from program to program. While *PathMinder* requires that you select the appropriate menu, highlight the file, and then press the Space bar, *XTREE* al-

lows you to tag with one keystroke. Depending on where the cursor is and what the filespec is, you can tag all the files on the disk or in the directory, or just the highlighted file. Some programs even permit you to reverse tags so that tagged files become untagged and vice versa.

Another useful though not essential feature usually found in these programs is the



### EDITOR'S CHOICE

*While any of the programs reviewed here will increase your productivity, two—XTREE and DOS2ools—stand out. XTREE's ease of use, functional visual tree, and ability to tag and manipulate any file from anywhere can make a power user out of a novice. XTREE does consume a lot of memory, but it is easy to exit from and to reenter the program when you need more free RAM. DOS2ools is more expensive than most of its rivals, and it requires that you have some knowledge of DOS to use it effectively, but it gives you a degree of power and flexibility not offered by any of the other programs. Since XTREE and DOS2ools serve different purposes, you might consider getting both.*

*Several other products are worthy of special mention: PathMinder, because it offers editing and menu generation features, while occupying only 4K bytes of RAM; 1dir, because of its ability to turn your present working procedures into batch files; and GASP!, because of its plug-in-a-utility feature.*

ability to view and change file attributes. An attribute option, when coupled with a tag feature, provides you with more flexibility and power to access, manipulate, and organize your files. Most of the programs display four attributes—read-only, archive, system, and hidden. Setting the hidden attribute can come in handy if you want to hide *Jet* or an Infocom game from your coworkers. Unsetting it enables you to find hidden files so you can erase them

and then the directory they were in. Changing the archive bit allows you to back up only those files you set. Defining a file as read-only prevents the file from being erased.

If you need more utility than the programs reviewed here can offer, you might want to look at alternative operating environment programs like *Microsoft Windows*, *TopView*, or *DESQview* (see "Operating in a New Environment," *PC Magazine*, Volume 5 Number 4).

## 1DIR

Bourbaki's *1dir* is perhaps the best-known DOS shell. Besides the traditional DOS commands, it offers menu and batch-file generation and DOS help facilities. *1dir*, however, was an early market entry and has been outstripped by more recent releases in terms of ease of use and non-traditional DOS commands. Its most notable gaps are its lack of both a Move command and a method for locating files in different directories.

The main screen contains a window for selecting files and directories; a menu bar that uses the function keys; and a status window that can display statistics, date and time, and status of options and modes. Nonmenu operations, which are entered at the DOS prompt, can be saved in batch files or added as menu choices. When building a menu choice, you can include variable parameters. *1dir*'s other features include a screen saver and the abilities to disable a ^C break and print files.

If you have already constructed batch



### FACT FILE



#### *1dir*, Version 3.5

Bourbaki Inc.  
615 W. Hays St.  
Boise, ID 83702  
(208) 342-5849  
List Price: \$95  
Requires: 192K RAM,  
DOS 2.0 or later.

**In Short:** Primarily a menu-generator and batch builder with extended DOS help files, *1dir* is intended for users who already have extensive batch files.

Circle 182 on Reader Service Card





Idir adds few commands to DOS, but it does provide you with an interface for batch files and the means to create them. The program's main screen is clear and well organized.

files for your system and don't need Move and Find commands, *Idir* is the shell for you. However, if you're starting fresh, try one of the other utilities.

## ALPS USER TOOLS

*ALPS User Tools* doesn't try to combine every utility imaginable under one common interface; it offers individual utilities. The advantage to this approach is that you can buy what you need without spending

any RAM for functions you don't want or already have. The drawback is the inability to tag files from one operation for another.

We looked at the *ALPS User Tools* utilities for listing directories, finding files, changing attributes, viewing files in Hex and ASCII, moving files, deleting files, and searching for a text pattern. The programs are fairly straightforward. You enter options on the command line as parameters. For example, to locate a .COM file with the DI (for directory) program, you enter "DI \*.COM" at the DOS prompt. You can redirect output to a file or the printer. At times, the programs are not as elegant as they would have been had they been integrated under one shell.

The brief documentation is more than adequate. As good as the utilities are—and some of them are extremely useful—*ALPS User Tools* is not for someone who needs hand-holding.

## DIREC-TREE

*Direc-Tree* had the clear potential to be one of the better file-management utilities in this review. The program offers virtually every feature and command you'd expect, including an editor and macros, and



### FACT FILE



**Direc-Tree, Version 3.51**  
Micro-Z Co.  
P.O. Box 2426  
4 Santa Bella Rd.  
Rolling Hills, CA 90274  
(213) 377-1640  
**List Price:** \$49.50 plus  
\$5 shipping and handling

**Requires:** 128K RAM, DOS 2.0 or later.  
**In Short:** A full-bodied file-management utility with all the essential features plus an editor and macros. Copy protection is a major drawback.

CIRCLE 680 ON READER SERVICE CARD


it's easy to learn and use. Unfortunately, it is copy-protected, so *Direc-Tree* is unlikely to find a home on many hard disks.

The main screen is a visual tree that you use to traverse subdirectories and highlight target directories when executing commands. Files appear on-screen when you execute the List command. One nice touch is the ability to rename files as you are mass moving or copying them. Other perks include the ability to define ten macros and 100 user-definable menu options for executing programs and macros and to send escape code sequences to printer.


Nice stuff, so come on, Micro-Z, get rid of that install/uninstall scheme!

## DOS PARTNER

*DOS Partner's* interface is intuitive, especially for 1-2-3 users, but the program itself offers very few enhancements to the



### FACT FILE



**ALPS User Tools**  
ALPS  
1502 County Rd. 25  
Woodland Park, CO  
80663  
(303) 687-1442  
**List Price:** \$19 to \$39 per  
utility, \$ for \$49, 29 for \$79

**Requires:** 128K RAM, DOS 2.0 or later.  
**In Short:** Individual utilities that are purchased and run separately. *ALPS* utilities are ideal for people who already have a collection of utilities.

CIRCLE 681 ON READER SERVICE CARD



### FACT FILE

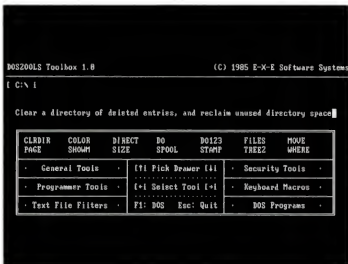


**DOS Partner**  
Software Development,  
Dept. P  
432 E. Wells St.  
Milwaukee, WI 53202  
(414) 223-0150  
**List Price:** \$39.95  
**Requires:** 128K RAM,  
DOS 2.0 or later.

**In Short:** A program with an intuitive interface that does little more than put a shell around DOS.

CIRCLE 682 ON READER SERVICE CARD

## ■ HARD DISK UTILITIES



DOS200LS may not have the most attractive interface around, but the program is intuitive and any function is no more than three keystrokes away.

traditional DOS commands. You can tag files and then reverse the tags, but the manipulative options are limited to erasing, renaming, copying, and viewing files and altering file attributes. *DOS Partner* lacks a visual tree and the ability to move and locate files and execute programs.

The program seems to be geared toward novices, but the 13-page manual is not. While the section dealing with the attribute option tells you to check the IBM DOS *Technical Reference* manual, it doesn't list the attributes, nor does it give any explanation as to what they do.

### DOS200LS

*DOS200LS*, a collection of 35 tools for the power user, system designer, and programmer, brings new meaning to the phrase "file management." In addition to the traditional DOS commands, it offers utilities for moving and locating files, assigning function keys, and creating macros. There is also a slew of programmer's tools for checking the contents of memory and disk sectors, switching video pages, and duplicating the file allocation table as well as user tools for stripping high bits from *WordStar* documents, isolating col-

umns of text, printing a specified range in a text file, and encrypting and killing files.

This is the only package that includes two methods of circumventing the file path. You can either issue a direct file path command or link files across subdirectories. This choice gives you the flexibility to keep *WordStar* (or any other program that predates DOS 2.0) and its documents in separate subdirectories.

You access the utilities, which are grouped into six "drawers," either by

pointing or entering the command's first letter. If you prefer, you can access the individual utilities directly on the DOS command line without invoking the shell.

The manual may be a little technical for the novice, but it comes with examples. The manufacturer provides technical support. If your workday involves more than booting one program, *DOS200LS* is indispensable.

## FILECOMMAND II

*FileCommand II*'s on-disk documentation, command-driven interface, and built-in language make it the least intuitive program in this roundup. However, if you wade through its murky waters, you are rewarded with features not available in other programs.

The main screen greets you with a list of the current directory's files. You enter commands between the filename and its statistics. If you execute a command by using a function key, the filename on the command line is passed along as a parameter. To exclude it, you must precede the command with a "o". Other codes enable you to repeat the preceding command, substitute drive, path- and filenames, and specify the program's options. You can fill a screen with commands and then execute them all at once. The files can be on different drives or directories. You can also list multiple commands on one line and then execute them for one file.

In relation to its competitors, *FileCommand II* has been around a long time (see

FACT FILE

**DOS200LS**  
Version 2.1B  
EXE Software Systems  
8855 Atlanta, #298  
Huntington Beach, CA  
92646  
(714) 662-2535  
List Price: \$99

Requires: 128K RAM, DOS 2.0 or later.

**In Short:** A comprehensive collection of over 35 utilities, including all the basics plus useful programmer's tools like switching video pages.

CIRCLE 688 ON READER SERVICE CARD

FACT FILE

**FileCommand II**  
IBM Personality Developed Software  
P.O. Box 3280  
Wallingford, CT 06494  
(800) IBMPCSW  
List Price: \$19.95

Requires: 128K RAM, DOS 2.0 or later.

**In Short:** One of the original DOS shells, *FileCommand II* is hampered by its interface and manual but contains such useful features as batch execution of commands.

CIRCLE 689 ON READER SERVICE CARD



## ■ HARD DISK UTILITIES

"The FileCommand Mystery," *PC Magazine*, Volume 3 Number 3). But despite its longevity and its useful features, this program will never be a big hit. Most users would rather press one key than learn a new language.

### FILE EASE

Delstar's *File Ease* comes equipped with a 45-page disk manual, a tutorial program, and 12 of the most commonly found file-management commands. However, it lacks commands to display a tree and execute a program. The absence of a visual tree forces you to enter many parameters manually.

In addition to tagging files, *File Ease* can reverse the tags and, after executing a command on the tagged files, can recall them for another operation on the same files. The find file option allows you to locate all found files without pausing or pause after each find and then view the file, jump to it, or continue. These options are also present in the Directory command.

Although *File Ease* is simple to use, it lacks some of the features necessary to make it stand out in this crowded market segment.



**FACT FILE**



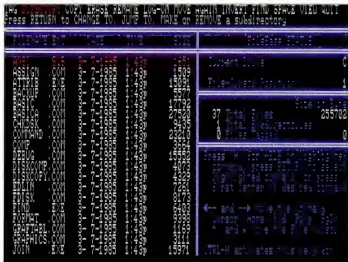
**FileEase**  
Delstar Inc.  
230 E. 400 South  
Springville, UT 84663  
(800) 858-1985  
(801) 489-8967  
List Price: \$44.95  
Requires: 128K RAM,  
DOS 2.0 or later.

**In Short:** A respectable file-management utility that lacks some features, such as a visual tree, found in other programs.

CIRCLE 66 ON READER SERVICE CARD

### FILEPAQ

*FilePaq* is a collection of six utilities that would enhance almost anyone's productivity. With them, you can change attributes, encrypt files, delete files, display directory listings, move files, and remove directories. You invoke the utilities individually at the DOS command line, at



*File Ease* is typical of programs that lack a functional visual tree: it has an isolated subdirectory, a 1-2-3-like menu with appropriate help messages, and subdirectory-specific statistics.

which time you can add parameters.


While this may not sound like much, the actual programs provide information and capabilities not found elsewhere. *SDAMOVE*, for example, not only moves files from one subdirectory to another but also permits you to move any directory and its files and subdirectory structure in one command. *SDADIR* can act as a simple *DIR* command, a *Find File* command, or a *Tree* command. When listing files, it pro-

vides information on the file's attributes and the amount of occupied and allotted space per file.


*FilePaq* is strongly recommended for users who want utilities but don't want to deal with shells.

### GASP!

*GASP!*, a clever acronym for the Great American Software package, is a recent




**FACT FILE**




**FilePaq, Version 3.0**  
SDA Associates  
P.O. Box 36152  
San Jose, CA 95158  
(408) 281-7747  
(415) 795-9624 (modem  
no.)  
List Price: \$39.50 plus  
\$3 postage and handling  
Requires: DOS 2.0 or later.

**In Short:** A collection of six separate, command-line-driven utilities that elegantly extend the power of DOS into areas such as encrypting files and moving subdirectories.

CIRCLE 68 ON READER SERVICE CARD



**FACT FILE**



**GASP!, Version 1.0**  
Great American Software Producers  
P.O. Box 901394  
Dallas, TX 75390  
(214) 343-3554  
List Price: \$39.95 plus \$2  
shipping and handling.

Texas residents must add sales tax.  
Requires: 128K RAM, DOS 2.0 or later.

**In Short:** Features like concatenation and user-defined commands make this newcomer a promising entry despite its awkward interface.

CIRCLE 69 ON READER SERVICE CARD



## ■ HARD DISK UTILITIES

```

B - Back
C - Copy
D - Delete
Ctrl - Find First
Ctrl - Find Last
M - Mark
Ctrl M - Unmark
P - Print

      Filename      Type      Date      Time      Size
      Written      Written
-----
UNDISK.BAT      BAT      1-21-86      5:14 PM
BUFF.BAT      BAT      1-21-86      5:14 PM
P.DRAIN      BAT      1-21-86      5:14 PM
CHSA      EXE      FILE
HELP      EXE      FILE
HELP      DTH      FILE
SHOW      EXE      FILE
COLOR      BAT      FILE
BAM      BAT      FILE
HCKDISK.BAT      BAT      FILE
FLOPPY.BAT      BAT      FILE
BEADG      EXE      FILE
COMMANDS.FIL      FILE
Next File      FILE
Next Directory      FILE
Next Next      FILE
Find Next      FILE
Help      FILE
1-14-86      8:15 PM      2103

```

*GASP! uses function keys and other keystroke combinations to execute the powerful commands that help compensate for its unintuitive interface.*

[illegible]

*KeepTrack Plus's main screen consists of two windows that grow and shrink in size as needed. The menu is a keystroke away; note the file statistics in the upper-right portion of the screen.*

entrant in the file-management utility arena. This program's interface is not the most intuitive, and navigation through subdirectories is a little awkward (the pro-

gram lacks a visual tree), but *GASP!* does offer plenty of useful commands.

The main screen displays the filenames on the right and the commands in two win-

dows on the left. You enter variables alongside the prompts. *GASP!* is the only program reviewed here that allows concatenation from within the shell. It also permits user-defined commands; if you fill out a few parameters, the command becomes part of the normal program and can be executed as any other command. Five public-domain programs were included in the prerelease version reviewed for demonstrating this feature.

**GASP!** displays a lot of flexibility, power, and promise, and its manual is filled with enough examples to make anyone understand how the system works.

**KEEPTRACK PLUS**

**KeepTrack Plus** offers relative ease of use and flexibility along with many of the standard file-management utilities, such as Move and Find. However, its particular strength is a fairly sophisticated backup and restore function.

The main screen consists of a functional visual tree that you can turn off and a list of the current directory's files. Files can be displayed as filenames only or with their statistics and attributes. The program's command menu pops up when you need it. Operations can be performed on individual files, selected files, or entire subdirectories. While *KeepTrack Plus* has a Find File capability, the program stops for input after each find.

The backup and restore feature maintains a library of archived files, allows you to select files for backup in addition to per-

**PC**  
magazine

## FACT FILE



**KeepTrack Plus**  
Version 1.03  
The Finot Group  
2390 El Camino Real,  
#3  
Palo Alto, CA 94306  
(800) 628-2828, ext. 700  
(415) 322-6161

**List Price:** \$39

**Requires:** 256K RAM, DOS 2.0 or later.

**In Short:** An extended DOS services program that includes a sophisticated backup and restore utility.

**CIRCLE 663 ON READER SERVICE CARD**



# Because you need the right word, the right phrase, the right meaning, and the right answer, *right now*, you need Borland's Turbo Lightning™

Since you write, think, work, live, breathe, and ask questions, you need the instant electronic support of Turbo Lightning—the fastest, most amazing information system since your brain.



You need the power of an astonishing program that checks your spelling as you type. The versatility of a program that gives you instant access to the 60,000-word Random House® Thesaurus and the 80,000-word Random House Concise Dictionary. The responsiveness of a program that remembers your name and any other words you teach it. The adaptability of a program that lets you do all of the above—while you run other programs. And of course the growth path of a program that is rapidly developing into a body of fully-fledged electronic reference works called the Turbo Lightning Library.™

Turbo Lightning checks your spelling as you type and while you run other programs. You could be running Lotus 1-2-3,® MultiMate,® MicroScan,® Redline,® SideKick,® WordStar,® or WordPerfect. It doesn't matter which one, because as you write, Turbo Lightning watches how you spell every word, and is ready to alert you to any mistakes.

So tell any your neighbors, who already have 25 unmatched sets of plastic flamingos on his front lawn, a broken boom-trailer, and a mistress, has now brought back a

coyote from a hunting trip. It howls all night, and you're writing a letter involving the word IDIOT, but you accidentally typed IDOT. What happens then? You immediately hear a beep, so you know something's up. You instantly see a window that doesn't list IDOT, but it does list IDIOT and its sound-alike words like this:



So you move your cursor to A, which is the correct spelling for IDOT, hit return, and the spelling mistake is instantly fixed.

**Turbo Lightning also gives you instant synonyms**

IDIOT was the word you planned to use in your note next door, but is it the best word? And should you use that particular word since your neighbor looks around with his gums when he's full of witless (which is every night), and besides that, he's 6'10", a black belt, and your cousin?

Because you have Turbo Lightning's Random House Thesaurus at your fingertips, you can look at the synonyms for IDIOT:

Type in IDOT and what you see is:



Any one of which expresses your opinion of your cousin's mental status. So write the letter, but don't mail it!

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If you're interested in the nuts and bolts, Word Wizard includes Turbo Pascal source code and all the technical information you ever likely to need.

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Henry Kisor,  
Chicago Sun Times

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Jim Seymour,  
PC Week

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- Word Wizard at \$69.95 \$ \_\_\_\_\_
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\*Special Introductory Offer valid until September 1, 1988.  
\*\*T1: within 60 days of purchase, should you find the product does not perform as advertised with our claims and recommendations, or call our customer service department and we will gladly arrange for a refund.  
\*\*\*Minimum System Requirements: IBM PC and/or hard disk, recommended hard disk 1MB and free computer.

L7



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## ■ HARD DISK UTILITIES

forming a full or partial backup, and automatically splits large files across disks. If you need back-up utilities along with your file management, *KeepTrack Plus* should be your choice.

### PATHMINDER

*PathMinder* attempts to supply you with everything you ever wanted in a DOS utility program: a familiar (I-2-3-like) command line, an editor, an encrypt/decrypt feature, a menu generator, a time billing feature, and more. While it succeeds to a great extent, it is not necessarily the program for everyone.

The program's greatest strength is its overhead—it eats up only a very thin 4K bytes of RAM. You can actually leave it in memory while executing such memory-hogging programs as *I-2-3* and *dBASE III*. Its greatest drawback is its visual tree, which is nothing more than a graphic representation. The actual process of directory navigation is performed by highlighting the subdirectory name in the listing and navigating through the menu.

While the program performed beautifully on most tests and offers more than its share of utilities, its interface requires more attention to setup than the other programs in this review. In order to use it effectively, you may need to change the way you normally work—something I loathe to do. For this reason, I ranked *PathMinder* lower than a more flexible user might. If you use *I-2-3* regularly, need to keep track of your usage, or have a use for menus, *PathMinder* is the program to have.



*PathMinder's help window displays the function key and cursor key definitions of the editor. The help window and the I-2-3-like menu bar make this DOS utility easy to learn, but the absence of a functional graphic tree makes navigation through the subdirectory structure somewhat tedious.*

### PC SWEEP

*PC Sweep* is an unassuming little program with some surprising features, the foremost of which is an Unerase option. The program's weakest point is its interface. When first invoked, it displays a list of the program's available commands. Hitting a key brings up the file screen. As each file is listed, the program stops and waits for you to either hit Return to bring up the next file name or enter a command to the right of the name.

Besides the features listed in the table, *PC Sweep* includes the abilities to recall tags and to back up and restore files larger than 360K bytes. On the negative side, during a global find, the program hung the system after finding 104 of 105 .COM files. Since the global find is a new feature in the program, I expect the bug to be exterminated in the next version.

If you don't already have *The Norton Utilities*, *PC Sweep* is one way of getting file management along with an Unerase utility.

### Q-DOS

*Q-DOS* is subtitled "The Professional Disk-Management Tool." It may not live up to that ambitious claim, but it is one of the better programs available, especially for the novice user. The initial screen displays the current directory; a functional tree is on another screen. *Q-DOS* uses a I-2-3-like menu bar as well as the function keys.

The program includes a status screen that displays date and time, the system's total and free RAM, the drives available, and the default filespec settings. When executing a file, you have the option of in-



#### FACT FILE



**PathMinder**  
Version 3.0  
Westlake Data Corp.  
P.O. Box 1711  
Austin, TX 78767  
(512) 474-4666  
List Price: \$39.95 plus  
shipping and handling

Requires: 256K RAM, DOS 2.0 or later.  
In Short: A 4K file-management program that includes enough features to make other utilities superfluous.

CIRCLE 682 ON READER SERVICE CARD



#### FACT FILE



**PC Sweep, Version 1.5**  
Koch Software  
Industries  
11 W. College Dr.,  
Bldg. G  
Arlington Heights, IL  
60004  
(312) 398-5440

List Price: \$79.95  
Requires: 64K RAM, DOS 2.0 or later.  
In Short: A DOS shell that includes a useful unerase feature and an archaic interface.

CIRCLE 681 ON READER SERVICE CARD



# DOES YOUR GRAPHICS BOARD SHOW YOU ONLY PART OF A SPREADSHEET

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And together with your 132-column printer, the Spectrum can also print every one of those 132 columns. So you can see more of

both graphics and color, you had to buy two boards. One for hi-res mono graphics, one for color.

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## ■ HARD DISK UTILITIES

SELECT the view type, then press the arrow keys to select the command. Change current directory, make or remove directory, see directory tree

PATH C:\DOS					
Count	Total Size	File Name	Size	Date	Time
37 Files	255,702	ANSI.SYS	1,654	7-85	1:43p
0 Directories		ASSIGN.COM	1,589	7-85	1:43p
0 Tagged	0	ATTRIB.EXE	15,051	7-85	1:43p
		BACKUP.COM	5,577	7-85	1:43p
		BASIC.COM	17,792	7-85	1:43p
		BASICA.COM	27,520	7-85	1:43p
		CHKDSK.COM	5,435	7-85	1:43p
		COMMAND.COM	25,210	7-85	1:43p
		COMP.COM	3,564	7-85	1:43p
		DEBUG.COM	15,355	7-85	1:43p
		DISKCOMP.COM	4,829	7-85	1:43p
		DISKCOPY.COM	4,829	7-85	1:43p
		EDLIN.COM	7,261	7-85	1:43p
		FDISK.COM	9,173	7-85	1:43p
		FIND.EXE	9,148	7-85	1:43p
		FORMAT.COM	9,398	7-85	1:43p
		GRAPHBL.COM	1,169	7-85	1:43p

Q-DOS -- Version 1.05  
Copyright (c) 1985  
GAZELLE SYSTEMS - Provo, Utah

Q-DOS's easy-to-understand main screen offers a number of valuable statistics. To move to Q-DOS's functional graphic tree, you would enter the Directory command.

C:\DOS					
MUSI	SYS	COMMAND	COM	SELECT	COM
ASSIGN	COM	COMP	COM	SHELL	EXT
ATTRIB	EXE	DEBUG	COM	SORT	EXT
BACKUP	COM	DISKCOMP	COM	SUBST	EXT
BASIC	COM	DISKCOPY	COM	SYS	COM
BASICA	COM	EDLIN	COM	TREE	COM
CHKDSK	COM	FDISK	COM	VDISK	SYS
		FIND	EXE		

Copy Dir Erase Find List MakeDir Purge Rename Sort Tree View

WindowDOS differs from most of the reviewed programs in that its tree is in a pop-up box. Also note the file attributes ("physda") at the top of the screen.

cluding the highlighted file as a parameter for an executable program. This feature facilitates the execution of BASIC and word processing programs. After executing a

program, you cannot remain in DOS but must return to the shell. The Find command allows you to list without pausing, view a file, or jump to the next. You tag

files by typing highlighting a sp

Q-DOS does n of a Direc-Tree o many users don't ne DOS offers.

PC  
MAGAZINE

## FACT

Q-DOS

Q-DOS, Version 1.05  
Gazelle Systems  
230 N. 2475 W.  
Provo, UT 84601  
(800) 233-0383  
(801) 377-1288  
List Price: \$69.95 (includes upgrades for life) plus \$3.00 postage and handling.

Requires: 256K RAM, DOS 2.0 or later.  
In Short: An easy-to-use shell that sticks to the essential features. Q-DOS will especially appeal to novice users.

CIRCLE 600 ON READER SERVICE CARD

## STILL RIVER SHELL

Still River Shell is unique as a user-shared program and differs from most of the shells in other ways as well. For example, it doesn't have a CHDIR command; you change the current directory by listing its contents. The Tree command displays only the structure of the current directory and its subdirectories. If you have a complicated tree structure, you must run the command a number of times to get a complete listing. Still River Shell is also one of the few programs that permits copying large directories to more than one disk.

PC  
MAGAZINE

## FACT FILE

Still River Shell

Version 1.21  
Bob Howard  
P.O. Box 57  
Still River, MA 01467  
(617) 456-3699  
List Price: \$39  
Requires: 76K RAM,

DOS 2.0 or later.  
In Short: A user-supported program that allows you to access its commands within batch files.

CIRCLE 679 ON READER SERVICE CARD

How many hours do you spend staring at your computer, waiting for your commands to finish?

# QuickDOS

## THE BLAZINGLY FAST HARD-DISK FILE MANAGER

The sheer speed of QuickDOS (Q-DOS) runs rings around the competition (just look at the comparison chart). QuickDOS was designed to manage the files on your hard disk better, faster, and easier than any other program available — and at the lowest price.



**SPECIAL PRICE \$29.95**

### QuickDOS is powerful, yet simple.

It instantly does what you want it to do, faster and easier than other DOS helpers. And QuickDOS does not confuse you with unnecessary commands. Other programs are slower, more expensive, and complicate things with "bells and whistles" which won't help you enough to justify their complexity.

### QuickDOS is easy to learn.

There are several competitive programs that claim to help you, but most of them were designed with the very experienced user in mind. You have to be a professional programmer to understand them. If you select the wrong program, the "learning curve" could eat up all the extra time you thought you might save — and even then, these other programs are much slower.

QuickDOS helps you when you need help. And when do you need help most? When you are in the middle of a command! Our context-sensitive help system (over 75,000 bytes of help) will tell you everything you need to know about any command or feature of QuickDOS — you won't need to read the user's manual (we give you one, anyway) because it is displayed on the screen when you need it.

File Manager Comparisons	Quick-DOS	Path-Minder	Xtree	Windows-DOS	Dirac-Tree	Keep-Track +	File
Sort 262 files (already in memory) by name	3 sec	25.6	2.1	6.6	65.4	4.6	2.6
Scan disk, display map of directories on drive C	7.9 sec	20.7	24.2	23.0	29.1	37.3	n/a
Same as above, but on a Removafix drive	2.7 sec	8.1	12.6	12.9	14.8	15.5	n/a
Return to file mgr after running a program (1)	0.1 sec	24.0	24.2	n/a	2.8	.7	1.8
Copy 23 files from drive C to drive A (2)	34.0 sec	40.2	38.0	41.6	74.1	51.9	43.7
Start-up program and find a file — maximum time (3)	12.3 sec	89.4	26.1	27.0	47.4	36.2	n/a
Show files on drive A, then return to drive C (1)	1.3 sec	40.3	25.5	12.4	5.5	30.2	7.1
Can be used to backup your hard disk?	YES	NO	NO	NO	NO	YES	NO
Intuitive on-line help in middle of commands?	YES	YES	NO	NO	NO	YES	NO
Is user manual available on the screen?	YES	NO	NO	NO	NO	NO	NO
<b>Price</b>	<b>\$29.95</b>	<b>\$39.95</b>	<b>\$49.95</b>	<b>\$49.95</b>	<b>\$49.95</b>	<b>\$79.95</b>	<b>\$95.00</b>

- (1) This shows the flexibility of the program; the time shown does not include the 2 or 3 second response time of user.  
 (2) PC-DOS 3.10 took 38.7 seconds  
 (3) Norton Utilities "file find" program took 24.9 seconds

### QuickDOS is a fully featured DOS helper.

You can copy, erase, rename, and move files without even typing a file name or directory path. You can make or remove directories, find misplaced files, and protect sensitive files. You can also backup your hard disk at the end of the day, copying only those files that have been modified since your last backup.

You will learn more about directories and subdirectories in your first 5 minutes with QuickDOS than you ever could with your DOS programs and manuals alone.

### QuickDOS is the least-expensive file manager available.

Why? Instead of supporting a dealer network, we have decided to market directly to the end user. We sell directly to you at the same price we would have charged dealers. **\$29.95 per copy.** We also offer volume discounts and site-licensing. And lifetime upgrades are a \$15 option.

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**Gazelle Systems**

230 North 2475 West  
Provo, Utah 84601

System Requirements: IBM PC, XT, AT, or compatible. Hard disk or two drives recommended. 256K memory, DOS 2.0 or higher

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## ■ HARD DISK UTILITIES

■ *With Still River Shell*, you can set up batch files to assign up to 40 user-defined commands to the function keys.

You can set up batch files to assign up to 40 user-defined commands to the function keys using combinations of the Shift, Alt, and Ctrl keys. Another option allows you to write the results of commands such as List and Find to a file. When you execute files, the shell brings you to the DOS prompt, and you hit the Ins key to add the highlighted file to the command line.

The manual, though well written, could do with a few more concrete examples. As good as this program is, it is not for people who would rather avoid commands and parameters.

## WINDOWDOS

WindowDOS is unique among the programs reviewed here in that it is a pop-up program and it includes such features as password protection and printer support. The fact that it is a pop-up utility explains why it lacks an Execute command, but neither that nor the password scheme explains the absence of a Move command.



### FACT FILE



**WindowDOS**  
Version 1.0  
WindowDOS Associates  
P.O. Box 531650  
Grand Prairie, TX 75053  
(800) 433-5355  
List Price: \$49.95 plus  
postage and handling

Requires: 40K RAM, DOS 2.0 or later.  
In Short: WindowDOS can be invoked as a pop-up utility or a shell. Its unusual features include extended printer support.

CIRCLE 67 ON READER SERVICE CARD

## PERFORMING UNDER PRESSURE

Timed tests were designed to emphasize the differences among the 16 hard disk utility programs. The test results below show the number of seconds that elapsed from execution of a command until the program returned control to the user. Not every package had the capabilities to perform every test.

First, we measured the time needed to load each program and display a tree. Some of the programs required an additional keystroke to call the tree option. The spectrum of results is very broad: *Still River Shell* and *I dir* loaded in under 7 seconds, while *FilePaq* took over 3 minutes. It was obviously the tree that slowed down *FilePaq* and some of the other programs; without the tree, none of the programs took more than 8.17 seconds to load.

Next, we timed the programs as they moved five files that totaled close to 2 megabytes from one subdirectory to another. Within a pretty small range—5.2 seconds to 13.26 seconds—*File Ease*

was the quickest and *ALPS User Tools* the slowest, with most of the programs taking 8 to 10 seconds.

Finally, we had each program locate 106 .COM files scattered over 20 directories. Note that certain programs, such as *PathMinder*, do not permit you to find all the files in one fell swoop. Instead, they stop after the first find and then ask whether you wish to continue. While a few of the others (such as *Q-DOS* and *File Ease*) have this same ability, they also enable you to view all of the matching files without pausing. *PC Sweep* was the only program that failed to complete this test; it hung the hard disk after locating approximately 104 of the files. Of those programs that successfully completed the test, only *XTREE* did not have a Find command (I set the filespec to \*.COM, then tagged and displayed all the files); it was also the only program capable of displaying all of the found files for further manipulation.

—Vincent Puglia

### Hard Disk Utility Performance Tests

	Load w/tree	Load w/o tree	Move	Find
1dir	6.56	N/A	N/A	N/A
ALPS User Tools	35.05	N/A	13.26	37.58
Dirc-Tree	10.81	N/A	7.56	43.37
DDS Partner	N/A	6.60	N/A	N/A
QDOS2ools	79.60	6.48	9.23	33.13
FileCommand II	N/A	3.22	N/A	N/A
File Ease	N/A	7.84	5.20	33.50
FilePaq	190.55	7.38	12.71	50.96
GASPI	N/A	7.71	10.49	N/A
KeepTrack Plus	31.44	N/A	10.27	N/A
PathMinder	27.77	8.17	8.31	N/A
PC Sweep	N/A	6.99	N/A	N/A
Q-DOS	11.57	N/A	7.68	9.23
Still River Shell	8.28	5.03	8.90	35.74
WindowDOS	34.20	N/A	N/A	43.29
XTREE	10.58	N/A	8.55	9.47

N/A = Not Applicable

All times are given in seconds and decimal seconds.

## ■ HARD DISK UTILITIES

Hard Disk Utility Features		COMMANDS															OTHER FEATURES											
		Single file					Multiple file					Directory					Execute DOS commands	Execute .COM/.EXE programs	Execute batch files									
PRODUCT	PRICE	Copy	Rename	Delete	Move	Tag	Reverse tag	Retag	Attribute	Find	Copy	Rename	Delete	Move	Concatenate	Tag				Reverse tag	Retag	Attribute	Find	Change	Make	Rename	Delete	View ASCII
1dir	\$95.00	■	■	■	■				■		■	■	■	■					■								■	■
ALPS User Tools	*	■	■	■	■					■	■	■	■	■						■	■			■	■	■	■	■
Direc-Tree	\$49.50	■	■	■	■					■	■	■	■	■						■	■	■	■	■	■		■	■
DDS Partner	\$39.95	■	■	■			■	■	■	■	■	■	■			■	■	■	■	■	■	■			■			
DDS2ools	\$99.00	■	■	■	■					■	■	■	■	■					■	■	■	■	■			■		■
FileCommand II	\$19.95	■	■	■							■	■	■								■	■	■	■				■
File Ease	\$44.95	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■			■			
FilePq	\$39.50	■	■	■	■					■	■	■	■	■					■	■				■				
GASPI	\$39.95	■	■	■	■	■	■				■	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■
KeepTrack Plus	\$39.00	■	■	■	■	■	■	■	■	■	■	■	■	■					■	■	■	■	■	■			■	■
PathMinder	\$39.95	■	■	■	■	■	■	■	■	■	■	■	■	■					■	■	■	■	■	■			■	■
PC Sweep	\$79.95	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■			■			
Q-DOS	\$69.95	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■		■
Still River Shell	\$39.00	■	■	■	■						■	■	■	■					■	■	■	■	■				■	■
WindowDDS	\$49.95	■	■	■	■	■				■	■	■	■	■		■	■	■	■	■	■	■	■			■		■
XTREE	\$49.95	■	■	■	■	■				■	†	■	■	■	■	■	■	■	■	†	■	■	■	■			■	■

\* \$19 to \$39 per utility; 5 for \$49, 29 for \$79 1XTREE does not have a Find command, but files can be located by a combination of Fileseek, Tag, and Showfile commands

\*\$19 to \$39 per utility, 5 for \$49, 29 for \$79. XTREE does not have a Find command, but files can be located by a combination of Filespec, Tag, and Showall commands

When invoked, *WindowDOS* displays the current directory. Calling for a tree requires an additional step. Since the program does not automatically rescan the drive when you return from DOS, the burden of updating the listings and statistics falls on you.

*WindowDOS*'s printer support includes such features as the ability to select the default printer and send the appropriate escape code sequences for character size and typeface, top of form line feed, and other parameters.

■ **XTREE's** intuitive interface includes a functional graphic representation of the disk's tree.

The 23-page manual is well written and adequate. Unfortunately, *WindowDOS* suffers from fatal gaps.

### XTREE

*XTREE* is a superb little program with an intuitive interface that includes a functional graphic representation of the disk's tree, windows displaying the current directory's files and statistics, and a command area. One- or two-keystroke commands easily manipulate files. You can display directo-

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PC Magazine  
May 13, 1986

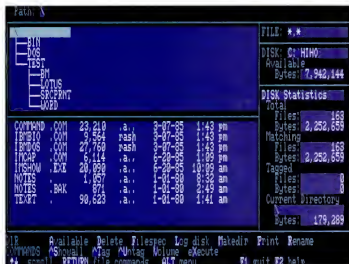
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When you move from XTREE's directory window to the command area, commands shown in the command area change. Additional commands, such as Select File Display, are available in the Alt menu.

ry listings as filenames only or with date, size, and attributes.

One of XTREE's most powerful features is the ability to use various commands to focus in on a given set of files. This, coupled with the capability to tag, display, and manipulate files in different subdirectories, provides uncommon flexi-

The 50-page manual is well organized and superfluous after the first reading. XTREE lacks some of the capabilities of other programs, most notably an editor and a menu system. What it does include is more than enough ease and productivity enhancement for anyone—novice or power user—who is not a programmer.

Vincent Puglia is a frequent contributor to PC Magazine.

### ■ XTREE's 50-page manual is superfluous after the first reading.

bility. By setting the filespec, tagging all the files from the directory window, and then displaying them, you can perform most file-management operations. Because you can set archive bits and then tag those files, you can use XTREE to back up files that you could not otherwise.

Despite its one or two flaws—it is memory hungry and it needs to rescans the disk when returning from an application—XTREE is easy to exit from, and you can remain in DOS as long as you like.

**PC FACT FILE**

**XTREE, Version 2.0**  
Executive Systems Inc.  
15300 Ventura Blvd.,  
#305  
Sherman Oaks, CA  
91403  
(800) 634-5545  
(818) 990-3457

List Price: \$49.95  
Requires: 192K RAM, DOS 2.0 or later.  
In Short: A utility that allows you an enormous amount of flexibility in using its file-management operations, while remaining easy enough for novice users.

CIRCLE 877 ON READER SERVICE CARD



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## 2,400-BPS UPDATE

# MODEMS FOR A NEW STANDARD

*The first significant crop of speedy 2,400 bps modems has begun to roll off the assembly lines. Just a year old, this product category is a thriving one full of impressive entries.*

If you still think 1,200 bits per second is a speedy telecommunications rate, you haven't joined the 2,400 club yet. First introduced into general use less than a year ago, fast 2,400-bps modems are now available from just about every major modem manufacturer—and numerous less-than-major manufacturers.

Last year, when *PC Magazine* first looked at 2,400-bps communications, just a handful of modems were on the market (see "A New Standard in Communications: 2,400 bps," *PC Magazine*, Volume 4 Number 15). When we surveyed the market this time, we identified 12 external 2,400-bps modems; we were able to test 8 of them. The reviews that follow will help you sift the best from the rest. However, before your passion for speeds sends you to your dealer to pick up one of these modems, you should give some thought to several issues surrounding 2,400-bps transmission.

First, there's the cost of the hardware it-

self. While prices are starting to come down, you'll still have to lay out a hefty sum (in the neighborhood of \$500 to \$900, retail, compared to a \$400-to-\$600 range for 1,200-bps modems) to gain admission to the 2,400-bps world. Unfortunately, paying the price of admission might not be enough. While your communications software should be able to support 2,400 bps and higher, you might not be able to access much at that speed in many parts of the country.

The major value-added networks, such as Telenet, Tymnet, and Uninet, offer support for 2,400-bps service on a growing but still somewhat limited basis. While all three are planning to offer more and more local dial numbers (at the rate of several cities a month), users outside of major metropolitan areas probably won't have local 2,400-bps service for some time (and if you don't have local 300/1,200 access right now, you can probably forget about 2,400 bps for the foreseeable future).

## ■ 2,400-BPS UPDATE

Another consideration is phone-line quality. While it is possible to transmit reliably at 2,400 bps over local phone lines, this speed pushes the limits of the local phone lines to the maximum. Any noise or line problems that cause errors for you at lower speeds are likely to be magnified at 2,400 bps.

**SPEED VERSUS REALITY** Assuming you can both afford the hardware and access a local carrier network at high speed, do you truly need the extra speed? If your telecommunications activity is limited to calling The Source for stock quotes, you'll simply be paying a speed surcharge (on The Source and most other on-line databases) for a task that doesn't require the extra speed. On the other hand, if you are uploading or downloading a lot of data—say with MCI Mail or NewsNet—or exchanging files between offices, the extra speed could save you a bundle.

Will 2,400 bps become at least a temporary standard, or will it be quickly surpassed by 4,800 bps or even higher transmission speeds? The jury is still out on this one, but new technologies are making reliable transmission at even higher speeds possible (see "FASTLINK: Communicating at 10,000 bps and Up," *PC Magazine*, Volume 4 Number 25).

Whether you have a genuine need for a high-speed modem or you just want to know about the latest in modem technology, you have a lot to look forward to. Although our eight test modems represent as wide as possible a range of prices and features, every one is packed with more functions than the average user is likely to tap. Don't be intimidated if you're new to the field, though—most of the modems are very easy to set up for basic communications use.

## HAYES SMARTMODEM 2400

Sometimes a product becomes the standard because it was the first, sometimes because it is the best. The Hayes Smartmodem 2400 falls into the second category—it is the standard because it fully deserves to be. Everything about the Hayes is first-rate, from the packaging to the documenta-

tion to the product itself.

The Smartmodem 2400 is built like a tank. Is that important to a modem? Probably. Unlike your computer, there's a better-than-average chance that you'll accidentally knock your modem off your desk at least once. The Smartmodem 2400 has a strong aluminum shell. Only the Microcom and Ven-Tel modems are similarly constructed; the rest are plastic. Despite the rugged construction and full complement of external features, the Smartmodem 2400 is actually the smallest product we tested.

The front panel sports eight lights to help you monitor call status, and the rear panel has an on/off switch along with inputs for the power adapter, phone and line jacks, and RS-232 cable. Removing the hard plastic front and rear caps (easily popped off with a screwdriver) and two screws allows you to slide the circuit board easily in and out of the shell—and one look at this circuit board will give you confidence in the product's longevity.

The Smartmodem 2400's features read like a laundry list. It can do autodial, autoanswer, auto-almost everything. Its performance and setup are exemplary. Take it

## PC FACT FILE



**Hayes Smartmodem 2400**  
Hayes Microcomputer Products  
705 W. Tech Dr.  
Norcross, GA 30092  
(404) 441-1617  
**List Price:** \$899

**In Short:** This ruggedly built, feature-packed modem from the industry leader performs flawlessly. Its high price is its biggest drawback.

CIRCLE 663 ON READER SERVICE CARD

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CIRCLE 394 ON READER SERVICE CARD

## ■ 2,400-BPS UPDATE

out of the box, plug it in, and you're set—particularly if you're using *Crosstalk XVI* or Hayes's own package, *Smartcom II*. Even if you're using different software, the Hayes AT (which stands for "atten-

tion," not for an IBM PC AT) command set is so universal (every modem tested supports it to varying degrees) that you should have no problem getting this modem running. At every transmission speed

(300, 1,200, and 2,400 bps), the Hayes works almost flawlessly.

This excellent modem is not without its flaws. Its internal memory can store only one phone number (other modems store up to ten), and it has no external speaker volume adjustment (volume is controlled via software). A more realistic quibble might be the price. Even at a discount, the Hayes costs \$100 to \$200 more than most of the other modems.

While you might be paying a premium for the Hayes name, you are definitely getting something valuable in return. The Smartmodem 2400 is the top of the heap.

## MULTI-TECH MULTI-MODEM 224

The Multi-Modem 224 is an appealing, attractively priced modem with much to recommend it. This intelligent modem from Multi-Tech Systems supports asynchronous and synchronous communications, Hayes-compatible protocols, manual and automatic dialing, and the two lower transmission speeds.

The Multi-Modem 224 is operational out of the box. The flat top of its plastic

■ The Multi-Modem 224's bells and whistles include storage for up to ten phone numbers.

case will easily support a standard telephone, if you like. The front panel contains lights for transmit, receive, carrier, 2,400 and 1,200 bps (the 300-bps speed is not indicated), off hook, and terminal ready. In addition, there are minirocker switches for data rate and voice/data originate and answer.

If you're familiar with the Hayes AT command set, you're ready to go. If not, the easy-to-understand manual will walk you through the necessary commands. You can use the Multi-Modem 224 with popular communications programs like



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CIRCLE 163 ON READER SERVICE CARD

Crosstalk XVI and PC-Talk III, and it also worked fine with some more obscure software I tried. The Multi-Modem 224 performs well, essentially matching the performance of the Hayes Smartmodem 2400. There was very little dropout, even at 2,400 bps.

The Multi-Modem 224's bells and whistles include storage (battery-backed) for up to ten phone numbers, automatic dialing support, keyboard dialing, autore-dial, continuous redial, and more. In fact, there's not a lot you can't do with the Multi-Modem 224. It supports pulse or tone dialing, with automatic parity and data rate selection, and all of the most popular protocols such as Bell 212A/103 and V.22bis for 2,400 bps.

A built-in speaker lets you monitor call progress (you can disable it if you wish), and the modem can perform a number of self-tests: local analog, local digital, and remote digital loops. One significant flaw is the lack of an external on/off switch. Modems without this feature are on all the time (until you unplug them) and can hang some communications software unless you unplug the modem or reboot your computer.

## PC FACT FILE



**Multi-Modem 224**  
Multi-Tech Systems Inc.  
82 Second Ave. SE  
New Brighton, MN 55112  
**List Price: \$699**

**In Short:** The Multi-Modem 224 adds some attractive extras to the usual range of features, such as storage of up to ten numbers. Its lack of an on/off switch, however, is a problem.

CIRCLE 188 ON READER SERVICE CARD

At \$795 the Multi-Modem 224 isn't cheap, but it can compete on price with the Hayes. The price includes free or reduced rate offers from a number of services (CompuServe, Knowledge Index, BRS,

and many others) and access to a technical support line (free). Considering the clear documentation and the ease of use, however, you shouldn't have to bother the folks who staff this service.



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Source: ENR Construction Economics Dept., *Engineering News-Record*, Issue Date: April 18, 1985.

CIRCLE 187 ON READER SERVICE CARD

# If you want to run software with graphics on your monochrome monitor, we have some bad news.

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Software Publishing, *PFS: Graph*  
Sorcim, *Supercalc 3*

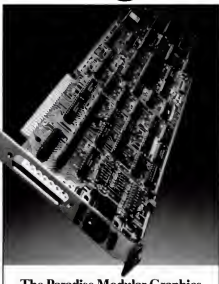
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Dow Jones & Co., *Dow Jones Market Analysis*  
Lotus Development, *1-2-3*, *Symphony*  
MicroPro, *Chartstar*, *Planstar*  
MDBS, *Knowledge Manager*  
Microsoft, *Basic Compiler*, *Basic Interpreter*, *Chart*, *Flight Simulator*, *Project*, *Word*  
PC Software of San Diego, *Executive Picture Show*  
Prentice-Hall, *Execuision*  
Schuchardt Software Systems, *Intercal*, *Intermate*, *Interpret*, *Interplan*, *Inteworld*  
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Scholastic, *Turtle Tracks*  
Sierra On-Line, *Dragon's Keep*, *Troll's Take*  
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PC Software of San Diego, *PC Crayon*  
Peachtree Software, *Business Graphics System*  
Arktronics, *Jane*  
Eagle Software Publishing, *Personal Financier*  
Monogram, *Dollars and Sense*  
Penguin Software, *Graphics Magician*  
Sierra On-Line, *Homeworld*  
Adventure Enterprises, *Sea Dragon*  
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CBS Software, *Match Wits*, *Mystery Master: Murder by the Dozen*  
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Muse Software, *Castle Wolfenstein*  
Odesta, *Backgammon*, *Checkers*, *Chess*, *Odin*  
Origin Systems, *Ultima III*  
Orion Software, *J-Bird*  
PC Software of San Diego, *Championship Blackjack*  
Penguin Software, *The Quest*  
Priority Software, *Forbidden Quest*  
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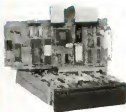


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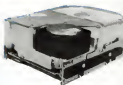
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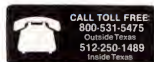
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## ■ 2,400-BPS UPDATE

### 2,400-bps Modems: Summary of Features

Manufacturer	Product	List price	Supported command sets	Internal telephone number storage	Auto-dial	Auto-answer	On/off switch	Modem clock	Help screens	Upgradable	Self-test mode	Command buffer	Tone/pulse dialing
AT&T	AT&T 4824	\$750	Hayes AT, Verbose, Terse	19	■	■		■			■		■
CTS Fabric Tek	CTS 2424ADH	\$395	Hayes AT	1	■	■	■					■	■
Hayes	Hayes Smartmodem 2400	\$899	Hayes AT	1	■	■	■		■		■	■	■
Microcom	Microcom AX2400	\$749	Hayes AT compatible, Microcom SX	9	■	■				to 9,600 bps		■	■
Multi-Tech	Multi-Modem 224	\$699	Hayes AT, Verbose, Terse	10	■	■			■		■		■
Racal-Vadic	Maxwell 2400V	\$595	Racal-Vadic, Hayes AT		■	■			■			with software	■
US Robotics	Courier 2400	\$699	Hayes AT		■	■	■	■	■				■
Vau-Tel	Vau-Tel 2400 Plus	\$695	Hayes AT	1	■	■	■				■		■

## US ROBOTICS COURIER 2400

The Courier 2400 is another excellent Hayes clone, right down to the eight indicator lights on the front panel. Despite its plastic shell, the Courier 2400 has a hefty feel, which should indicate long life, and some nice design features.

Turning it upside down reveals a whole world of information. The entire Hayes AT command set summary is listed as well as the S-register functions, and although both are useful this is a cumbersome way to reference the information. Fortunately, the AT command set is also listed on a pocket reference card. The underside of the Courier 2400 also contains the DIP switches, which are recessed in a window that is easily reached with a pen or screwdriver but not so easily that they can be accidentally turned on or off. You'll appreciate this feature if you need to change the DIP switch settings often. A sliding volume control can be accessed from the side when the product is right-side up.

Although it's obvious where the RS-232 cable and power connection attach on the back panel, you can't tell which telephone connection is for the phone and which one is for the jack on the back; that information, too, is inconveniently located on the Courier 2400's underside.

US Robotics has given the Courier 2400 all the features you could ask for. A modem clock can be used to time calls or as a real-time clock, and extensions to the AT command set will give you an on-screen display of the current communications parameters, result code messages, and other operational controls. You can also access several help panels by invoking the appropriate AT commands.

The Courier 2400 also supports "data rate fallback" (the modem adjusts to the bps rate of incoming calls) and "adaptive dialing" (automatically sensing tone or pulse dialing). And, yes, it does have an on/off switch.

The Courier 2400 performed similarly to the rest of the top group of the tested modems, and at \$699 it's worthy of your consideration.

PC  
MAGAZINE

## FACT FILE



**Courier 2400**  
US Robotics Inc.  
8100 McCormick  
Skokie, IL 60076  
(312) 982-5010  
List Price: \$699

**In Short:** The Courier 2400 is a good performer with a lot of features, such as a clock that you can use to time calls. Its otherwise good design suffers from the awkward placement of some of its controls on the bottom.

CIRCLE 661 ON READER SERVICE CARD



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	EVERCOM	HAYES 1200B
• 300/1200 bps. Hayes-compatible	YES	YES
• Half-size card	YES	NO
• Automatic dialing, answering, anti-echoing	YES	YES
• Call Progress Monitoring	YES	NO
• Configurable from COM1 - COM4	YES	NO
• Internal Speaker with software adjustable volume control	YES	NO
• Error rate control testing	YES	YES
• Automatic data-to-voice transition	YES	NO
• Detects receiver off-hook	YES	NO
• Reports speed mismatch	YES	NO
• Supports 132 columns	YES	NO
• Communications software included	YES	NO
• Extended Hayes command set	YES	NO
• List price	\$249	\$489

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in the living room!"



CIRCLE 226 ON READER SERVICE CARD

## ■ 2,400-BPS UPDATE

### VEN-TEL 2400 PLUS

Except for its color and its lower price, the Ven-Tel 2400 Plus mimics the Hayes Smartmodem 2400 in virtually every respect. Like the Smartmodem 2400, it has an aluminum shell, a circuit board that slides in and out of the shell on rails, and duplicate connections. The rear panel has

■ Except for its lower price, the Ven-Tel 2400 Plus mimics the Hayes in virtually every respect.

the same four connectors (serial cable, power, telephone, and phone jacks) and a small on/off rocker switch. The front panel has the same eight lighted indicators as the Smartmodem 2400, arranged in the same order. Ven-Tel does add a small push switch on the front panel that will automatically dial the one phone number the mo-



## FACT FILE



**Ven-Tel 2400 Plus**  
Ven-Tel Inc.  
2342 Walsh Ave.  
Santa Clara, CA 95051  
(408) 727-5721  
**List Price:** \$695

**In Short:** The Ven-Tel 2400 Plus gives you Hayes Smartmodem compatibility and functionality at a lower price, without many extras. Its pop-off cover makes the DIP switches easily accessible.

CIRCLE 660 ON READER SERVICE CARD



dem is capable of storing.

The 2400 Plus has a nice touch that you will notice if you need to adjust the two banks of DIP switches: the metal cover pops off and pops back into place. You don't need to fuss with screwdrivers or any other tools.

Because the Ven-Tel is a functional equivalent of the Hayes, its performance holds few surprises. In fact, if you put both products in brown paper bags and switched them, you wouldn't be able to tell their performance apart. Naturally, the 2400 Plus supports all three bps rates (300, 1,200, and 2,400), autodial, autoanswer, and the AT command set.

If you want Hayes features, compatibility, and performance at a lower price, the 2400 Plus is the modem for you.

## RACAL-VADIC MAXWELL 2400V

The Maxwell 2400V takes a unique approach to 2,400-bps transmission, and the difference is obvious as soon as you take it out of the box.

### PC FACT FILE



**Maxwell 2400V**  
Racal-Vadic  
1525 McCarthy Blvd.  
Milpitas, CA 95035  
(408) 946-2227  
**List Price:** \$595

**In Short:** The Maxwell 2400V's streamlined appearance belies its many features and sophisticated performance. Two indicator lights take care of monitoring the functions for which most modems use eight lights.

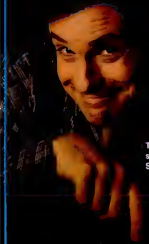
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2134 S. Ritchey St., Santa Ana, CA 92705 (714) 540-4141

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## ■ 2,400-BPS UPDATE

Unlike its competitors, the Maxwell 2400V is not covered with lights, switches, and other buttons. This modem's design is the essence of simplicity: it's very sleek and low-profile with no visible controls, and its only indicators are one red and one green light on the front panel.

There's a lot to be said for this type of simplicity, especially for novice users who are put off by the idea of setting S-register options and DIP switches. Racal-Vadic has successfully made everything as simple as possible. The manual is well-written, informative, and as clean as the modem in its graphic approach.

To its credit, Racal-Vadic didn't sacrifice features to provide simplicity. The modem has as much going for it as any of the other products tested. It's "autoeverything" and supports the AT command set. The Maxwell 2400V also supports the less widely used Racal-Vadic protocol.

The Maxwell 2400V has some other in-

teresting features. To initiate your customer support (the modem carries a 2-year warranty), you dial the 800 number for Racal-Vadic headquarters, where the technical staff can do on-line diagnostics for you.

■ The Maxwell 2400V's design is the essence of simplicity: it's very sleek and low-profile.

As might be expected, the setup of the Maxwell 2400V was "plug in and go" and its performance excellent.

Several drawbacks keep me from giving the Maxwell 2400V an unqualified endorsement. While a manual volume con-

trol is loaded underneath the box (for the speaker volume), there is no on/off switch. And while the idea of only two lights to indicate status is a good one on paper, if you really want to monitor your call status, you will need to refer to your manual. The two lights are used in combination (on/off and flashing) to indicate the same functions that the eight individual lights on most other modems take care of.

Other than these small points, the Maxwell 2400V is worthy of consideration for anyone who is looking for an unimpeachable, easy-to-use, high-speed modem.

## AT&T 4024

You'd expect AT&T, the communications giant, to deliver a top-notch, high-speed modem. After all, without AT&T we wouldn't even have phone lines to transmit files over. But life is full of surprises: the

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**CIRCLE 249 ON READER SERVICE CARD**

## ■ 2,400-BPS UPDATE

AT&T 4024 modem turned out to be the least attractive of all the products evaluated in this review.

The AT&T 4024 does, however, have some nice touches, such as a front-mounted speaker (many modems have the speaker on the bottom) and an easily adjustable volume control that is also front-mounted. The front-panel lights indicate data/talk, status, test, carrier and send/receive, and the back panel takes the connectors for power, phone, and RS-232. Otherwise, the AT&T 4024 is like a fortress. If this modem has secrets, they're well hidden. The modem has no power switch or external DIP switches, and removing the cover reveals that the AT&T 4024 has no internal switches either. What you see is absolutely what you get.

The Hayes-compatible AT&T 4024 was the only modem I tested for this review that demonstrated any significant data degradation on any of my transmis-



# FACT FILE



**AT&T 4024**  
**AT&T Information Systems**  
 1 Speedwell Ave.  
 Morristown, NJ 07960  
 (201) 898-2000  
**List Price:** \$750  
**In Short:** AT&T's 4024 is disappointing in small details, like its user-inaccessible innards and space-hogging power supply as well as in its performance. One attractive feature is the front-mounted speaker.

CIRCLE 68 ON READER SERVICE CARD

sions. The AT&T 4024 also has one significant design flaw: its power supply terminates in one of the largest black boxes you're likely to see for a transformer—it's over 4 inches long. The Racal-Vadic Maxwell 2400V and the Ven-Tel 2400 Plus modems also have very large power supplies, but their power supply boxes are thoughtfully located between the modem input and the actual plug, with a good length of cable on either side. Unfortunately, the AT&T 4024's black box is located at the termination of the cable, with the plug attached, making it impossible to plug anything else into a standard outlet and taking up the space of at least three to four outlets on a standard six-outlet power strip. If you're tight for space, you may have a serious problem.

Considering the excellence of the other products tested, you may find a number of other products to meet your needs better than the disappointing AT&T 4024.

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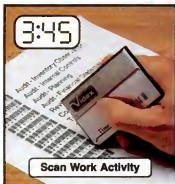
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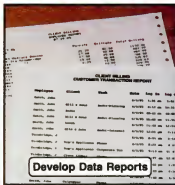
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Develop Data Reports

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Available in three different memory configurations, TimeWand can store from 2,000 to 16,000 characters in its internal memory. This means you can hold from a few hundred to a few thousand bar codes in the TimeWand before transferring the information to a host computer system.

TimeWand time-stamps *each* bar code as it's read. This lets you know not only what the bar code says, but *when* the code was read.

The TimeWand's recharging/download station uses a standard RS232C serial connector that allows you to communicate with the wand through a variety of host computer systems. Since the communication is keyless, the scan information is sent quickly and error free. Currently, software packages are available for the IBM PC (and compatibles), Apple //, and Apple Macintosh personal computers.

Put the power of TimeWand in your own hands... and let it work for you.

TimeWand (2K version) - \$198

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TimeWand Manager Software (Macintosh) - \$499

TimeWand Communications Software (IBM) - \$299



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## 2,400-BPS UPDATE

### MICROCOM AX/2400

If you were to choose a modem purely on the basis of design appeal, the Microcom AX/2400 would be the clear-cut choice. The black brushed-aluminum case shouts high-tech efficiency. Fortunately, the AX/2400 is also loaded with features, and its performance matches its sports-car good looks.

The AX/2400's front panel has seven indicator lights plus two switches, one for voice/data and the other for synchronous/asynchronous communications. The rear panel has connections for telephone jacks, RS-232 cable, and power and a reset switch. Openings for a speaker volume control and for the configuration DIP switches must be accessed with a screwdriver or other tool. The rear panel sports a lip that hangs over the openings, so I found it impossible to connect my RS-232 cable without first removing the rear panel. The

**PC**  
FACT FILE

FACT FILE



**Microcom AX/2400**  
Microcom Inc.  
1400A Providence Hwy.  
Norwood, MA 02062  
(617) 762-9310  
List Price: \$749

**In Short:** The AX/2400 is a modem to grow with—it can be upgraded for speeds up to 9,600 bps. Its design is high tech and so is its performance.

CIRCLE 867 ON READER SERVICE CARD

## GOING LOCAL WITH A NULL MODEM

*The null modem is the poor man's answer to communication between all types of computers.*

**I**f you're intrigued by the current focus in telecommunications on faster transmission of files, don't overlook a product that can be useful for certain types of applications: the null modem.

A null modem is more or less what its name implies: the absence of a modem. About the size of a gender-changer cable, the null modem can be an extremely efficient and cost-effective way to handle some local data links. If you have more than one computer in your office or two incompatible operating systems or disk sizes, a null modem can be the perfect solution. I use a null modem regularly to transfer files between my PC, my lap portable, and an older machine with 8-inch disk drives.

While a null modem isn't nearly as sophisticated as a network, it can perform some functions that most networks can't handle. You might think of it as the poor man's answer to promoting peace, understanding, and communication be-

tween computers of all types.

To use a null modem you also need two computers, two RS-232 cables, and communications software running on both machines. You plug both cables into the null modem, set one machine to answer and one to call, and "go local," as the *Crosstalk* command says. From there you can easily transfer files in the same way you would if uploading or downloading to a service like MCI—except at a faster bps rate (usually 9,600). You can transfer any files you could transfer with a regular modem, and this is a much easier way to solve incompatibility problems than uploading files to MCI with one machine, and then downloading to a second.

For under \$20, a null modem is a great investment. Null modems may not be as flashy as some of the newer high-speed modems, but they're extremely useful tools that are more than worth the investment. —Jon Pepper



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**MAX-12** High resolution amber monitor. When used with an IBM-compatible monochrome adapter delivers 720 x 350 resolution. With an IBM-compatible color adapter, 640 x 200 resolution with 15 shades of amber. The monitor automatically adjusts to either card.



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CIRCLE 224 ON READER SERVICE CARD

## ■ 2,400-BPS UPDATE

AX/2400 also has no power switch. These are the only poor choices in a well-thought-out and well-executed design.

In performance, the AX/2400 acts as flashy as it looks. It can store up to nine

phone numbers, is factory upgradable to speeds reaching 9,600 bps (a potentially important consideration), and supports almost every other option available. You can even connect several Microcom AX/2400

modems via an external chassis.

Besides the expected Hayes AT command compatibility, the AX/2400 also supports the Microcom SX command set and the Microcom Networking Protocol (MNP), which provides a high level of error-free performance. Although MNP is being adopted by some carrier networks, you need to connect to another modem supporting MNP to make use of it.

The AX/2400's manual is thorough, and the modem itself, despite its advanced features, is very easy to use. It interfaces with popular communications programs like *Crosstalk XVI* and *PC-Talk III*; the manual contains full instructions for using these particular packages.

If you want high performance and the option of upgrading to higher speed levels, look into the AX/2400. It should be able to handle your communications needs for some time to come.

## CTS 2424ADH

Most 2,400-bps modems are priced in the \$500-to-\$800 range. The CTS 2424ADH lists for \$395, making its price its most sig-

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**FACT FILE**



**CTS 2424ADH**  
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Datacomm Products Division  
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**List Price:** \$395; with software, \$459  
**In Short:** CTS's 2424ADH has an unbeatable price and good performance to match. The features you'll sacrifice to save a few hundred dollars include an internal speaker and decent documentation.

**CIRCLE 100 ON READER SERVICE CARD**

nificant feature. Not that the 2424ADH is a cheap product; when a group of products are as close in features and performance as these modems are, an extremely low price becomes an important mark of distinction that you can legitimately factor in to your purchasing decision.

The 2424ADH's plastic housing is just about the same height and width as the Hayes Smartmodem 2400, perhaps even a 1/2 inch shorter in length. It was the lightest product I tested, and its neat, clean, functional appearance easily beats many more-expensive modems in terms of design. The rear panel has AC and RS-232 connectors and an on/off switch—again, an improvement over the approach taken by some competitors.

The eight status indicator lights on the front panel include one marked SQ (for signal quality), which lights up when the modem has detected poor line quality (at 2,400 bps) and the data received may be

corrupted. The two phone-jack inputs are located on the modem's side.

The 2424ADH has enough features to keep most people happily telecommuni-

■ The CTS 2424ADH has enough features to keep most people happily telecommunicating, including Hayes compatibility.

cating: Hayes compatibility, autoanswer and autodialing, pulse and tone operation, nonvolatile configuration storage, storage

for a single phone number, and more. While it does lack some extra features—like automatic detection of pulse or tone lines—you really need to consider whether you'd use those features if you had them.

The performance can't be faulted. Its specifications match or are close to the Hayes specs, and the actual performance is fine, meaning uneventful. By now you're probably wondering what the catch is.

CTS did have to compromise a few things to save money, but the compromises affect areas you might not care about. The 2424ADH has no internal speaker, so you can't listen in on the modem's progress. At first this bothered me, but after a while I started to enjoy the quiet. The documentation, which was typeset on a dot matrix printer, lacks the packaging flair of the Smartmodem 2400 or the Microcom AX/2400 and isn't as helpful. However, it contains clear instructions on how to hook up the product, and that may

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CIRCLE 523 ON READER SERVICE CARD

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# The best tools are the simplest.

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## Start off running

Almost the instant you start up Infoscope on your PC, you can start to enter material, sort it, select sections from it, display it, transfer it to disk or print it.

Infoscope is a data handler that accepts and deals with data without complicated programming. It lets you file data without the artificial restrictions — such as length and number of fields per record — that slow you down on other programs.

Its "on-disk tutorial" helps you get acquainted through examples. Then, its "command/menu" system lets you progress at your own speed. Any time you need it, press a "choice" key and Infoscope will give you appropriate choices for the task at hand.

For the expert, Infoscope offers 40 function keys you can program to perform complex tasks with a single keystroke.

And because Infoscope stores your data in RAM, it responds much more quickly than other data base managers. Sorting time for 1000 records is 3 seconds — compared with times from 38 seconds to 5 minutes on popular integrated applications software.

## Easy in, easy out

You can enter data into Infoscope in a variety of ways.

CIRCLE 325 ON READER SERVICE CARD

Directly, of course. Right off the keyboard, without a lot of formality.

But it also reads files from other programs such as dBase, 1-2-3, and Multiplan.

That means you can selectively enter a file from larger storage into Infoscope, where you can manipulate it and print it out much more quickly.

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Whatever you want out of Infoscope, you can get — in color or monochrome, in any of as many as 14 expandable windows, or "Scopes."

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Infoscope requires minimum 192K RAM (256K recommended), DOS 2 x-supported hard disk or two double-sided floppy disks.

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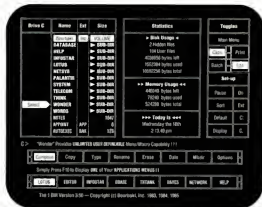


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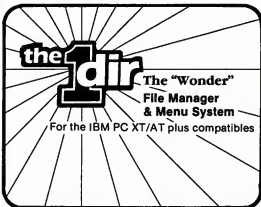
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CIRCLE 507 ON READER SERVICE CARD

# 3 REASONS TO "WONDER"



The "Wonder" screen acts as a sophisticated control panel to guide novice users and speed experienced users through the intricacies of program selection and file management. Its menuing/macro functions and point and shoot file management can help companies as well as individuals **Organize, Customize and Standardize** computer operations.



"Wonder" is compatible with IBM, its compatibles, portables and a wide range of network systems. System requirements — IBM PC/XT/3270 PC/AT/jr. or compatible; DOS 2.0 or higher; one disk drive.

## 3. <sup>It's</sup> PROVEN

"Wonder" has earned high marks and a reputation as an industry standard through years, not months, of user input and development. Besides the thousands of registered users that have relied on "Wonder", it has been put to the test by hundreds of small businesses and site licensed by corporations like IBM, AT&T, GM and UPS. Over the years it has made hard disk operation easier for thousands, by providing the friendly face that greets users of Quadram, QUBIE and Basic Time Systems. Currently "Wonder" is licensed by more hard disk manufacturers than any program of its kind.

"Wonder" has grown in popularity the old fashioned way — by word of mouth from one satisfied user to the next. Today those words are echoed by those who review the industry — here's what they're saying.

**Compute 10/85:** "Whether you're a beginner or an experienced user, 1dir ("Wonder") can simplify your introduction to MS-DOS and make your time on the computer more productive."

**Info World 11/85:** "This is the one we would choose if we really needed the powerful features..."

**PC Products 8/85:** "Quite simply 1dir ("Wonder") works flawlessly..."

**PC 12/85:** "Overall 1dir does indeed spell WONDER."

## 2. <sup>It's</sup> POWERFUL

"Wonder" is not only an uncomplicated environment for beginners, it's also a sophisticated tool for experienced users. It's excellent in a hard disk environment where file organization and accessibility are a must. The "point and shoot" "Wonder" system makes single or multiple file operations fast and nearly effortless.

With the unique Menu Builder you can create single key stroke commands to run programs or perform any multi-file, multi-command operation. The utility of the Menuing System is that it functions with the same simple cursor movement that drives the rest of "Wonder", so any user familiar with File Manager can easily build custom menu commands. Almost anyone can create a turnkey system that takes the hassle out of DOS forever.

Many corporations have an ulterior motive for introducing new users to "Wonder". Its menuing system is an excellent vehicle for establishing standardization. Through a system of shared commands companies can assure speed and uniformity while reducing support requirements.

Don't settle for JUST file management. Get the extended power of "Wonder".

## 1. <sup>It's</sup> EASY

Many corporate training centers and independent training consultants across the country use "Wonder" to soothe initial fears and pave the way to increased productivity. It eliminates the complex and hidden nature of DOS and replaces it with a point and shoot file management system. With "Wonder", training centers are finding that beginners don't stay novices for very long — the average is DOS literate and functional in hours not days.

The same strengths that make "Wonder" popular with training specialists make it ideal for independent users. First "Wonder" requires no special training; all major functions are cursor driven. It eliminates the need for you to remember syntax or type DOS commands. Secondly "Wonder" includes a DOS help system that can actually help beginners to learn DOS basics. And, finally, "Wonder" is easy to install — a relative novice can install a basic system in minutes.

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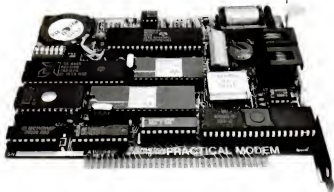
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# PARING COMMUNICATIONS TO THE BARE ESSENTIALS



*If concise code appeals to you, try using TINYCOMM, a 49-byte assembly language program, with a five-line BASIC program to connect with another computer.*

Perhaps more than any other type of software, communications programs are surrounded by an aura of mystery. If you've done any kind of programming you probably have a good idea what it would take to write a word processing, database management, or spreadsheet program. Sure, it'd be tough, but at least you know generally what's involved. Communications programs are not quite like that. The typical communications program puts such a heavy layer of software between you and the modem that its inner workings are often obscured.

Part of the problem results from the fact that communications software works in such close interdependence with the modem. Since the modem itself is programmable, the software is written to let the modem do part of the job. In one way, of course, that makes the communications program simpler. Unless you know what the modem is capable of doing, however, it may make understanding the related communications program more difficult.

By letting your modem do its own thing, it's possible to write rudimentary communications programs with only a few lines of code. I'll show you how. Doing so, in fact, will help you both to explore the functions built into the modem and to discover how such small communications programs must be supplemented to provide the functionality of larger ones.

**THE TINIEST COMM PROGRAM** Figure 1 shows how you can use DEBUG to create TINYCOMM, which I believe to be just about the smallest possible "function-

```

DEBUG
-A
XXXX:0100 MOV     DL,[005D]    ; Get Parameter
XXXX:0104 AND     DX,0001
XXXX:0108 MOV     AH,03        ; Get Comm Status
XXXX:010A INT     14
XXXX:010C TEST    AH,01        ; If nothing, go on
XXXX:010F JZ      011F
XXXX:0111 MOV     AH,02        ; Read character
XXXX:0113 INT     14
XXXX:0115 PUSH    DX
XXXX:0116 MOV     DL,AL
XXXX:0118 MOV     AH,02        ; Write to display
XXXX:011A INT     21
XXXX:011C POP     DX
XXXX:011D JMP     0108         ; Loop around
XXXX:011F MOV     AH,0B        ; Check Keyboard
XXXX:0121 INT     21
XXXX:0123 OR      AL,AL
XXXX:0125 JZ      0108
XXXX:0127 MOV     AH,08        ; If char, read it
XXXX:0129 INT     21
XXXX:012B MOV     AH,01        ; Send to modem
XXXX:012D INT     14
XXXX:012F JMP     0108         ; Loop around
XXXX:0131
-N TINYCOMM.COM
-R CX
CX 0000
:31
-W
Writing 0031 bytes
-Q

```

**Figure 1:** If you have DOS's DEBUG.COM on your floppy or hard disk, you can create a 49-byte communications program called TINYCOMM by simply typing in the programming lines above, starting from the DOS > prompt. Do not enter the addresses (XXXX:XXXX)—DOS will do that for you. Further, you don't need to type the semicolons and the comments after them.

## ■ PC LAB NOTES

al" assembly language communications program. It's 49 bytes long. You'll see later the reason for the qualifying quotation marks when I call it "functional." TINYCOMM has many limitations, but, by stripping one part of the software/modem connection to the bare bones, TINYCOMM will help you explore some of the factors involved in modem communications software.

TINYCOMM uses the ROM BIOS Interrupt 14h to read incoming data from the modem and to write outgoing data to the modem. It uses DOS Interrupt 21h function calls to read what you type at the keyboard and to write to the display. (Interrupt 14h is documented in the BIOS listing contained in the *Technical Reference* manuals for the PC, XT, and AT. Interrupt 21h is documented in the DOS *Technical Reference* manual.)

TINYCOMM first makes a status call to Interrupt 14h. If the status word returned in register AX indicates that the modem has received a character, TINYCOMM calls Interrupt 14h again to get the character, then displays it to the screen through DOS. If no character has been received yet, TINYCOMM goes on to check if anything has been typed at the keyboard. If so, it sends the typed character to the modem, again by Interrupt 14h. Then it goes back to the top. Notice that in both cases (reading the modem and reading the keyboard), TINYCOMM first checks if anything is ready. It doesn't want to get stuck waiting for a character from either source if none is available.

To use TINYCOMM, first turn on your modem and execute the PC-DOS MODE command to set it up for 300 bps, no parity, 8 data bits, and 1 stop bit:

```
MODE COM1:300,N,8,1
```

Do not try 1,200 bps just yet. If your modem is connected to COM2, use that instead of COM1 in the MODE command above.

Now run TINYCOMM by entering

```
TINYCOMM
```

for a modem connected to COM1, or

```
TINYCOMM 1
```

for COM2. You're not on-line yet, but you are in direct connection with your modem.

## S Registers for Hayes-Compatible Modems

REGISTER	RANGE	DESCRIPTION	DEFAULT
S0	0-255 rings	Ring to answer telephone on	0 or 1*
S1	0-63/0-255rings	Signal quality/number of rings	—
S2	0-127 ASCII	Escape code character	43(+)
S3	0-127 ASCII	Character recognized as carriage return	13(CR)
S4	0-127 ASCII	Character recognized as line feed	10(LF)
S5	0-32, 127 ASCII	Character recognized as backspace	8(BS)
S6	2-255 sec.	Wait time for dial tone	2
S7	1-60 sec.	Wait time for carrier	30
S8	0-255 sec.	Pause time (caused by comma)	2
S9	1-255 1/10 sec.	Carrier detect response time	6
S10	1-255 1/10 sec.	Delay between loss of carrier and hang up	7
S11	50-255 millisees.	Duration and spacing of Touch-Tones	70
S12	20-255 1/50 sec.	Escape code guard time	50
S13	bit mapped	UART status register	—
S14	bit mapped	Option register	—
S15	bit mapped	Flag register	—
S16	0, 1, 2, 4	Test modes	0

\*0 (no answer) or 1 ring depending on setting of modem switch 5.

*This is the S-Register set for the Hayes 1200. Any Hayes-compatible modem generally follows this command set. To set any of the registers, type AT S, the register number, the value you want to store, and hit the Enter key. For instance, to set the S0 (auto answer) register to not answer (to Hayes, not answer means answer after zero rings), type AT S0=0 <Enter>.*

**TALKING WITH YOUR MODEM** If you have a Hayes Smartmodem or compatible, you can now type in any of the AT attention codes documented in the user's guide or reference manual that came with the unit. For instance, with the Smartmodem 1200 or 1200B, you can enter

```
ATI0
```

to see the product's revision number,

```
ATI1
```

for the modem's ROM checksum, and (with the 1200 but not the 1200B)

```
ATI2
```

to check the integrity of its internal memory. This last instruction will return either OK or ERROR.

The "Smart" in Smartmodem refers to the modem's ability to interpret such AT codes and to send back appropriate re-

sponses. If your phone happens to ring while you're experimenting like this, TINYCOMM will display the word RING. Similarly, when using your normal communications programs, you may have noticed the words CONNECT or NO CARRIER displayed when you attempted to place a telephone call. These messages are not produced by your communications package; they all come straight from the modem, whose internal programming generates them.

Now let's make a call to the *PC Magazine* Interactive Reader Service bulletin board. To do this, enter

```
ATD 212-696-0360
```

If you have Touch-Tone service, you can use ATDT instead of ATD. (Even if you only have pulse dialing, you might try this command anyway: at the risk of having the telephone company read this, I'll tell you

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## ■ PC LAB NOTES

that I don't have Touch-Tone service but I have been dialing modems with touch-tone for years.)

If you have an external modem, you'll see your modem's OH (Off Hook) light go on and you'll hear the dialing. If the PC-IRS has a free line, you'll hear the PC-IRS carrier signal, quickly followed by your modem answering that carrier signal with its own. The CD (Carrier Detect) light on your modem will go on, you'll see the word CONNECT on the screen, and then the modem will go silent. You're on-line. (When you eventually want to get out of TINYCOMM, just press Ctrl-Break.)

If you get a busy signal, eventually your modem will give up and you'll get a NO CARRIER message on your screen. You can redial by typing A/, which is the only Hayes control sequence that does not require a preceding AT.

Notice that TINYCOMM is doing very little in establishing this connection. Almost everything is handled by the modem itself. After you enter ATD and the phone number, the modem waits a couple of seconds for the dial tone before dialing the number and, if it doesn't detect a carrier, waits another period of time before sending back the NO CARRIER message and placing the phone back on the hook. You can set these two timings and many other variable aspects of the Smartmodem with modem control sequences (see S Registers table). Specifically, ATS6, followed by the time in seconds, controls the dial-tone wait; ATS7 similarly controls the carrier-detect wait. If you want to listen continuously to the carrier signals while you're on-line, you can enter ATM2 before making the call.

You can't enter these AT codes directly while you're on-line because the modem has no way of determining that you want to talk to it instead of to the remote computer. To give commands while on-line, you first enter the Hayes escape sequence, which consists of three plus signs (+++) in a row, typed quickly. You must wait a second before typing in the first plus sign, and wait a second afterwards before typing anything else. (The modem uses these brief pauses to distinguish its escape sequence from three plus signs that may occur in transmitted data.) Having entered the +++ code properly, you'll get an OK

from the modem, indicating that you're in the command state instead of on-line. After you finish giving commands, ATO returns the modem on-line.

If you want an escape sequence other than three plus signs, that too is programmable, as the Hayes manual explains.

**SPLIT-LEVEL DUPLEX** You'll notice that the TINYCOMM program uses the DOS Function Call 08h for reading your keystrokes. According to the DOS *Technical Reference* manual, however, this function call does not echo keystrokes to the screen. So why then can you see your keystrokes as you type them?

Some of the characters you enter at the

---

■ **Echoing of characters on the screen is often inaccurately referred to as full-duplex communication. A better term is remote-echo or echoplex.**

---

keyboard will be modem AT control sequences. The modem itself echoes these characters back, so TINYCOMM reads them as characters coming from the modem. (You can turn off this modem echoing with the command ATE0. Then when you type an AT code, you won't see it on the screen. Turn this type of modem echoing back on with ATE1.)

When you get on-line with a remote computer, however—whether it's an information service (such as CompuServe, The Source, or Dow Jones News/Retrieval) or with a bulletin board such as *PC Magazine's* IRS—the host computer echoes back most of the characters it receives. That's why you'll sense a slight delay between the time you type characters and their display on the screen.

This echoing is often inaccurately referred to as full-duplex communication. A better term is remote-echo or echoplex. It requires that the two computers handle

data differently. On your end, your communications program is reading the keyboard and sending the characters out to the modem without echoing them to the display. The host computer to which you are connected sends most of these characters back to you (with a few exceptions) in addition to sending you its own data.

On your receiving end, your program really can't tell whether a particular character was sent by the remote computer or echoed. If you also echoed back to the host computer everything you received, you'd really be thrown for a loop, because the characters would be continually tossed back and forth between the communicating computers.

When you use a modem to communicate with another PC or some other small computer, you'll probably want to use local echo (often inaccurately called half-duplex). With local echo, each communications program handles the data the same way: by echoing keyboard characters to the screen as they are being typed and sending them out to the modem at the same time.

If you get on-line but find that you can't see what you type, it simply means that your software is set up for remote echo, but the computer you're talking with thinks you're using local echo. If you see two of every character you type, the cause is just the opposite.

**GETTING TWO PCs TALKING** If you want to connect with another PC over the telephone lines, you'll probably want to use local echo. You can do this in one of two ways. First, you can change TINYCOMM to use Function Call 01 instead of Function Call 08 for reading from the keyboard. A better way, however, is to instruct the modem itself to echo what you type by entering the control sequence ATE0. (You can later return to remote-echo with ATE1.)

Another consideration that arises when two PCs are to communicate is the carrier frequencies. Two separate sets of frequencies are used by communicating modems. They are called "answer" and "originate" frequencies, but are really independent of which modem is making the phone call. When you call an information service or bulletin board, by convention your mo-



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## ■ PC LAB NOTES

dem uses the originate frequencies. When you connect with another PC, however, you must decide which PC will use answer and which will use originate.

The easiest way to establish a connection between two PCs over the telephone lines is to first establish a voice communication. After you decide upon a common speed, data bits, parity, and stop bit and have everything set up, the person using originate frequencies enters

ATD

and the other person (using answer frequencies) enters

ATA

■ When you use TINYCOMM to go on-line with another microcomputer, you'll have a chance to try out one of the most interesting DOS commands, CTTY.

The answer carrier will sound first, then the tone from the originate modem. Now hang up the phones and start typing.

At this point another consideration arises that must be addressed: the problem of line feeds. When you press the Enter key, you generate only one character—ASCII 13, the Carriage Return. When your screen receives this character, its proper response is simply to move the cursor to the beginning of the current line. However, the carriage return code does not tell the cursor to move down to the beginning of the next line: to move the cursor down one line, you need a Line Feed character (ASCII 10).

Most real communications programs will add the extra line feed, but TINYCOMM will not. Unless you want to change TINYCOMM to do this, you can get around it by typing a Ctrl-J (line feed)

after every Enter. Or, instead of pressing Enter, you can press Ctrl-M and Ctrl-J. Yes, you can get accustomed to it.

### THE AMAZING CTTY COMMAND

When you use TINYCOMM to go on-line with another microcomputer, you'll have a chance to try out one of the most interesting DOS commands, CTTY. TINYCOMM is ideal for CTTY for two reasons. First, TINYCOMM will not break the modem connection when you leave it by using Ctrl-Break. Many other communications programs will. Second, unlike other communications programs, TINYCOMM just uses Interrupt 14h instead of doing anything fancy. (You'll see later that this is a deficiency when it comes to more-serious communications work.)

To try out CTTY, first use TINYCOMM to establish a modem connection with another microcomputer operated by a friend you would trust with your PC. This friend does not need to be using TINYCOMM or even an IBM PC.

Now, instruct your friend to turn off his or her local echo. Then, exit TINYCOMM with Ctrl-Break and at the DOS command level simply enter

CTTY COM1

(or COM2 if that's where your modem is). Your DOS prompt will then appear on your friend's screen and not on yours. If your friend enters DIR, you won't see it but your disk drives will whirl, and the directory listing will appear on the other computer's display. (Now you see why this person should be someone you trust. That DIR could just as easily be a DEL \*.\*.)

After your friend has been fully amused by using your PC over the telephone line, he or she can enter

CTTY CON

At that point, your DOS prompt will appear back on your screen, and you can re-enter TINYCOMM to continue your on-line communication.

### WHAT'S GOING ON HERE?

CTTY allows another device (in this case the communications port) to be substituted for DOS's normal standard input device (the keyboard) and standard output device (the

screen). Any program that uses DOS function calls for keyboard and screen display will then use this alternative device instead of the default CON device. Any of the DOS internal commands (with the exception of CLS) will work, as well as most of the DOS programs such as CHKDSK, EDLIN, and DEBUG.

If your friend tries to run Lotus's 1-2-3, however, it will appear on your screen and accept input from your keyboard. This is because 1-2-3 (like most spreadsheet and word processing programs) does not use DOS for keyboard input and screen output. The BASIC interpreter also does not use DOS for keyboard and screen and will

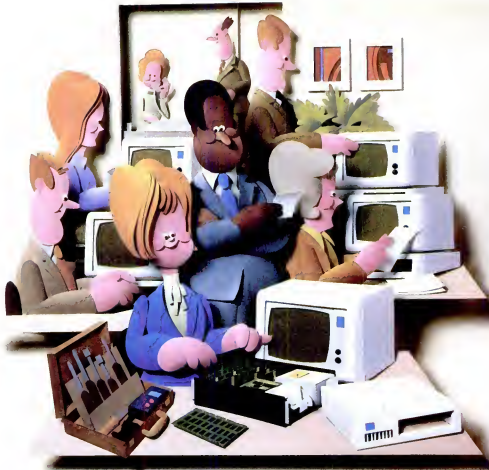
■ CTTY allows another device to be substituted for DOS's normal standard input device as well as the normal standard output device.

not work with CTTY.

For a real treat, if your friend's communications program supports terminal emulation (ANSI or VT-100, for example), you can patch *WordStar* to tell it that it's not running on an IBM PC, in which case it will use DOS for the keyboard and screen. You then patch *WordStar* to use screen control sequences for positioning the cursor and anything else the terminal emulation program allows. Your friend can then use *WordStar* over the telephone lines, even on a Macintosh (on a Macintosh?). To work with *WordStar* at a 300-bps screen update rate is a fascinating experience and one that will allow you to catch a few winks after every Ctrl-C (Page Down).

### THE LIMITATIONS OF TINYCOMM

When I introduced TINYCOMM above, I said it would produce some problems. If you've been using it to communicate with



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## ■ PC LAB NOTES

## HOTEL-TO-OFFICE COMMUNICATIONS: YOUR BEST TOOL IS INGENUITY

*Bringing the right equipment along increases the repertoire of tricks you can use to connect your portable to the phone.*

There's nothing more frustrating than arriving in a far-flung city with a portable full of files created on the plane, only to find that the hotel's phone lacks an RJ11 jack and is hard-wired to a wall outlet. Maybe folks used to steal them, although I can't imagine that the usual beige monstrosity would make a very appealing addition to the rec room. However, cut off from electronic mail and the home office, you'd like to do more than steal the phone.

But if reason prevails, all you have to do is carry a short RJ11-to-spade lug adapter, with alligator clips on the red and green leads. You then have two choices for hooking to the phone: one is to simply unscrew the mouthpiece. The carbon microphone will fall out, and you

can clip your leads directly to the spring contacts in the handset. The drawback is that your modem tones go through a transformer in the phone's innards, which reduces the volume. This can be a problem in areas where the lines are notoriously bad, such as the Las Vegas area and parts of the Pacific Northwest.

Alternatively, you can take the phone apart (I carry a Swiss Army knife for such emergencies; it has also dispatched the occasional wine cork). On the right side you will see the transformer block, which has a colorful array of wires plugged into it. You are looking for the red and green wires that come into the phone from the back. Clip onto these, and all will be well. There is a small trick to keeping the disassembled phone hung up: place the handset on the hook levers upside down. You may also have trouble with the message light, if the phone has one. The wires are generally annoyingly short.

Occasionally, hotels do have RJ11 jacks, so you may want to carry a modular duplex jack, which allows both phone and PC to be connected to the wall. Other useful accessories are a coiled phone cord to extend your portable's reach around the room and an in-line coupler to make a longer phone cord out of two shorter ones. Everything is readily available at Radio Shack.

The only other small matter of concern is one of legality. Some state laws forbid direct connection of devices to a privately owned telephone system—to which I say, "So arrest me!" The equipment is all FCC-approved. Besides, the hotel will never be the wiser if you put the phone back together before room service comes in.—Bill Machrone



An RJ11-to-spade lug adapter, with alligator-clip leads, helps connect your portable to the outside world from a hotel.

information services or bulletin boards, you've probably already noticed some of these oddities.

Although TINYCOMM is programmed in assembly language and thus, in theory, is very fast, you can't use it at 1,200 bps. Don't believe me? Try it out by changing the bps setting with MODE and connecting to an information service or bulletin board. If you start at the top of the screen, things seem to go fairly well at first, but once you get down to the bottom of the screen, you'll notice that TINYCOMM starts missing the first few letters of each line that is sent from the remote computer.

Communications programs do not normally use Interrupt 14h, as TINYCOMM does. This is because Interrupt 14h is missing two very important ingredients of normal communications software: buffering and interrupt control. Instead, TINYCOMM simply polls the serial port for data, and if it can't do its polling fast enough, it misses characters. This is what happens when the screen scrolls at 1,200 bps. During the time it takes the screen to scroll, several characters at the start of the line are coming through.

Real communications programs don't have this problem because they use the serial port's interrupts and buffer all the data. Let's see how this works.

**THE UART PORTS** The Interrupt 14h code in the ROM BIOS is not very big as assembly language goes—just a bit over two pages in the *Technical Reference* manual. It works by accessing the 8250 UART (Universal Asynchronous Receiver Transmitter) through I/O ports. These ports are at addresses 3F8h through 3Fh for COM1 and 2F8h through 2Fh for COM2.

Where you can find documentation on these serial I/O ports depends upon what type of modem you have. The Hayes 1200B internal board modem comes with a *Hardware Reference Manual* that discusses the ports in detail, since the UART is part of the board. The standalone modem connects by cable to an asynchronous communications port and the registers involved are also discussed in the documentation for the serial board in any of the *Technical Reference* manuals for the PC.

If you are new to UART programming

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## ■ PC LAB NOTES

and want to learn how to do it right (instead of using Interrupt 14h), be prepared to spend many long hours with these few pages of documentation—studying the Interrupt 14h code until you understand every single line of it—and in doing lots of experimentation.

The greatest advantage to programming the UART directly through the I/O ports is the ability to enable its interrupts. Instead of polling the UART status, as TINYCOMM does, a real communications program is driven by hardware interrupts. The UART can be programmed to generate an interrupt whenever it receives a character or is ready to send another character.

A real communications program will also buffer outgoing and incoming data. When a new character is received, the interrupt routine stores it in a circular buffer. When the main communications program accesses incoming data, it retrieves it from this buffer instead of from the port.

Similarly, typed keyboard input goes into another circular buffer. As the UART sends this data, it generates a hardware interrupt when it's done with one and ready for another. That way, the main program can shovel a lot of data to the buffer and not wait for the UART to transmit it all. (If you want to try programming something like this, you might also benefit from looking at the code for keyboard Interrupts 9 and 16h, in the ROM BIOS listing. That will show you how circular buffers work.)

**THE SOLUTION IS BASIC** If we were to add direct UART programming, interrupt control, and buffering to TINYCOMM, it wouldn't be tiny for long.

So let's change direction. Let's use some software supplied with PC-DOS that already has built-in data buffering and interrupt-driven communications logic. You didn't know you already had such software? Sure you do. It's all there in the BASIC interpreter.

Figure 2 shows another simple communications program called BASCOMM. Let me say first that this program also has some deficiencies, some of which are repeated from TINYCOMM, some of which are new. Otherwise, it works almost the same as TINYCOMM. You enter the modem control sequences directly and press Ctrl-Break when you want to get out.

```
10 OPEN "COM2:300,E,7,1" AS #1
15 OPEN "SCRN:" FOR OUTPUT AS #2
20 IF NOT EOF(1) THEN PRINT #2, INPUT$(1,1);
30 AS = INKEY$: IF AS <> "" THEN PRINT #1, AS;
40 GOTO 20
```

**Figure 2:** A small communications program written in BASIC. More sophisticated BASIC communications programs are shown in the IBM BASIC manual and included with PC-DOS (COMM.BAS). PC-Talk III is an example of an extremely sophisticated BASIC program.

The new problem you'll encounter is double spacing of all incoming lines of data. This is BASIC "helping" you out by sticking a line feed onto each carriage return. Unfortunately, in remote-echo communications, you don't want that extra line feed.

You'll also notice (as you probably did with TINYCOMM) that at various times you'll see two odd characters appear on your display: the double exclamation point (ASCII 19 or Ctrl-S) and the left-pointing triangle (ASCII 17 or Ctrl-Q). These characters have formal ASCII names of DC3 and DC1. The DC stands for Device Control, but in modem communications they are more commonly referred to as XOFF and XON.

When your communications program receives a Ctrl-S (XOFF) character, that is a signal to tell your program to stop sending data. The computer you are connected to is telling you (by sending XOFF) that it is doing something else and may suffer a buffer overflow if you continue. Likewise, when the remote computer sends a Ctrl-Q (XON), it is signaling that it can resume receiving data from you.

Your communications program might also want to send XOFF and XON to the remote computer. With the simple BASCOMM program, you can do that yourself simply by pressing Ctrl-S and Ctrl-Q. Generally you stop the flow of data to give you time to read it.

XOFF and XON become more important during ASCII file transfers. For instance, if you add some file-transfer logic to the BASCOMM program, you must send XOFF when beginning a disk access. This prevents a buffer overflow while you are using the disk. When you are done with the file access and have read enough characters from the buffer to deplete it, you can then send an XON to signal that data transfer may be resumed.

BASIC has several other built-in functions that will help you manage the input buffer. These include LOC (which tells you the number of characters in the input buffer) and LOF (the buffer's free space).

At this point, however, instead of fixing up BASCOMM to include these additional features, let me direct you to Appendix F of IBM's BASIC 2.0 manual or to Appendix C of the BASIC 3.0 manual. Under the heading "An Example Program," you'll find a 20-line BASIC program (documented with lots of comments) that handles both the line feed problem and the XON/XOFF protocol.

PC-DOS also comes with a free communications program called COMM.BAS. This one has a menu to set the bps rate, parity, and data bits, but it's really just a fancy version of the small program shown in the BASIC manual.

Once you print out COMM.BAS and get familiar with its workings, your next step can be to look at a real communications program written entirely in BASIC: the famous freeware program, PC-Talk III. If you use this program, you probably use the compiled version, but the 800 tightly coded lines of BASIC source code are available on many bulletin boards.

## IN PRAISE OF SMALL PROGRAMS

Although it's tough to beat the power of several recent (and large) communications programs, such as *Ascom* or *Microsoft Access*, you may find a smaller communications program is sometimes preferable—for the same reasons that people sometimes prefer riding a bicycle to driving a car. You're more in control, closer to the ground, unsheltered, and feel every bump. It's more adventurous and also, of course, much more fun. ☐

*Charles Petzold is a contributing editor of PC Magazine.*

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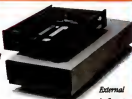
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## ■ PROGRAMMING/UTILITIES ■ CHARLES PETZOLD

# MAKE EXCEPTIONS WITH NO.COM



*How can you make a command act on all but a specified file or wildcard group? You just tell it No, with NO.COM.*

While global filenames using the ? and \* characters are certainly handy, they don't handle every circumstance. For example, have you ever wanted to delete all the files on a diskette or subdirectory except one or two? One of the editors at *PC Magazine* has been pleading with me for months to write a Copy Allbut utility. He wants to be able to copy an entire subdirectory to a diskette with the exception of certain files. Another editor said he would prefer a No Dir command. He wants to go into his BASIC subdirectory and list everything except the .BAS files. Then he can decide what to do with them. It seems to me that he'd then want a No Del command to erase all the files except certain ones.

For all these problems, and probably some others I'm not yet aware of, I have a simple answer: NO. NO.COM is a program that does everything you want it not to do. It's for those occasions when \*.\* is convenient but you'd rather not go quite that far.

## SAYING NO TO COMMANDS

NO uses the following syntax:

**NO filespec Command [parameter]**

Here, Command refers to the command you want to execute, such as DEL. Depending on the command, you may or may not need an additional parameter. The filespec specifies which files you want to exclude or protect from the operation of the following command. The filespec can include an optional drive or path, and it can include globals using the \* or ? wildcard characters. NO will be most useful with

DIR, COPY, DEL, and RENAME.

For instance, to list all your files on the current drive and directory except the ones with a .BAS extension, use the command

```
NO *.BAS DIR
```

Because you've specified \*.BAS as the NO file specification, the DIR command will not display any files with a .BAS extension. To delete all the files except the

cute. This is not the limitation you might fear, however, for you can stack NO commands. For instance, in the subdirectories where I keep my assembly language programs, I often want to clean up by deleting everything except the .ASM and .COM files. Here's the command I use to do it:

```
NO *.ASM NO *.COM DEL *.* *
```

The following syntax, however, is *incorrect* and will not work:

```
NO *.ASM *.COM DEL *.* *
```

■ NO.COM is a program for those occasions when \*.\* is convenient but you'd rather not go quite that far.

BASIC programs, you enter

```
NO *.BAS DEL *.* *
```

The DEL command will still ask you if you're sure about it, but you can safely type Y and DEL will not touch your BAS files. Similarly, to copy everything except the BASIC files to a diskette in drive A:, use the command

```
NO *.BAS COPY *.* A:
```

Simple, no?

**NESTING NO** NO itself accepts only one file specification between the word NO and the command you want to exe-

You need a separate NO for each filename (or wildcard category) you want to exclude, and each successive NO filespec is added to the list to be protected from the succeeding command.

Because NO itself (like most assembly language programs I write) incorporates bits and pieces from earlier programs I had written, my NO subdirectory was pretty cluttered when I was done. I also had a few batch files in there for testing the program. I eventually cleaned up my NO subdirectory with the command

```
NO NO.* DEL *.* *
```

That took out all the files except those named NO.

## ADDING NO TO YOUR DOS TOOLS

You can get a copy of NO.COM for your own, noncommercial use by any of several methods. If you have a modem, simply call the *PC Magazine* Interactive Reader Service (PC-IRS) at (212) 696-0360 at 300 or 1,200 bps, 8 data bits, no parity, and 1 stop bit. If your communications software supports Xmodem file transfer, you

## ■ PROGRAMMING/UTILITIES

can download NO.COM directly. If your communications program does not support the Xmodem protocol, you can download NO.ASM and use one of the IBM or Microsoft Macro Assemblers to create NO.COM using the following commands:

```
MASM NO;
LINK NO;
EXE2BIN NO NO.COM
```

Ignore the "No Stack Segment" message from LINK.

If you don't have one of the Macro Assemblers, you should. (The Microsoft Macro Assembler 4.0 is the fastest and comes with the best utilities. The IBM Macro Assembler, Version 2, has a far better reference manual.) In the interim, however, you can download NO.ASM from the PC IRS, rename it to NO.BAS, load it into BASICA, and run it. This will automatically create the NO.COM file.

If you don't have a modem or the patience to get on the PC-IRS, you can type in NO.ASM from Figure 1 and assemble it as shown above. If you don't have a Macro Assembler, you're stuck typing the NO.BAS program shown in Figure 2 into BASICA. If you use the same line numbers I have, you'll be informed of most typing errors when you run it. A "Successful Completion" message indicates NO.COM has been created and is ready to use.

**HOW DOES NO.COM DO IT?** NO is actually a very simple program once you know the trick of how it protects files from other commands.

When DOS stores a file on a disk, it also stores a file attribute as part of the directory entry. This file attribute is just 1 byte, but 6 of the 8 bits in this byte determine whether a file is marked read-only, hidden, system, volume label, subdirectory, or archive. What these various attributes mean is documented in IBM's *DOS Technical Reference* manuals.

The key to the workings of NO is the bit that specifies a file as hidden. Most DOS commands (including DIR, COPY, DEL, and RENAMES) ignore hidden files. For instance, every disk formatted using the /S (system) parameter contains two hidden files called IBMBIO.COM and IBMDOS.COM. You won't see these files listed

```
; NO.ASM -- Hide specified files from command that follows
; =====

CSEG      Segment
Assume    CS:CSEG, DS:CSEG, ES:CSEG, SS:CSEG
Org       002Ch
Label     ; Segment of Environment is here
Envirment Label 0000h
Paramter  Label Byte
Entry:    Org 0100h
          Jmp Begin ; Entry Point

; Most Data (comes more at end of program)
; -----
          db "Copyright 1986 Riff-Devie Publishing Co.",1Ah
          db "Programmed by Charles Patzold",1Ah
BytexpReg db "Syntax: NO filespec command [parameter]$"
DoeVarReg db "ND: Hade DOS 2.0 + $"
FileSpecReg db "ND: Incorrect File Spec$"
TooManyReg db "ND: Too many files to hide$"
MemAllocReg db "ND: Allocation Problem$"
CommandReg db "ND: COMMAND Problem$"
Delimitare db 9, " ", " "
FileList   dw 7 ; Storage of found files
FileCount  dw 8 ; Count of found files
FileListEnd dw 7 ; End of storage of found files
BreakState db 7 ; Store original break state here
Conspec    db "CONSPEC=" ; String for Environment search
ParamBlock dw 7 ; Parameter block for EXEC call
           dw 7, 7
           dw 5Ch, 7
           dw 6Ch, 7
StackPointer dw 7 ; Save SP during EXEC call

; Check DOS Version
; -----
Begin:     Nov AH, 30h ; Check for DOS Version
           Int 21h ; through DOS call
           Cmp AL, 2 ; See if it's 2.0 or above
           Jea DosVerOK ; If so, continue

           Nov DX, Offset DoeVarReg ; Error message
ErrorExit: Nov AH, 9 ; Print string function call
           Int 21h ; Do it
           Int 20h ; And exit prematurely

; Parse Command Line to get NO File specification
; -----
ScanParam: Lodsb ; SUBROUTINE: Get byte
           Cmp AL, 13 ; See if end of parameter
           Jz ErrorExit ; If so, exit
           DI, Offset Delimitare ; Check if delimiter
           Nov CX, 5 ; There are 5 of them
           Repne Scasb ; Scan the string
           Ret ; And return

DoeVarOK: Nov DX, Offset BytexpReg ; Possible error msg
           Nov SI, 1-Offset Paramter ; ND Parameter string
           Cld ; Direction forward

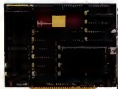
BegSearch: Call ScanParam ; Check byte in subroutine
           Jz BegSearch ; If delimiter, keep searching
           Nov BX, SI ; Save pointer in BX
           Dec BX ; BX points to ND file spec

EndSearch: Call ScanParam ; Check byte in subroutine
           Jne EndSearch ; If not delimiter, keep going

; Construct full FilePath and save down at end of program
; -----
           Dec SI ; Points after ND file spec
           Xchg SI, BX ; SI points to beg, BX to end
           Nov DI, Offset FullPath ; Points to destination
           Cmp Byte Ptr [SI+1], ' ' ; See if drive spec included
           Jnz GetDrive ; If not, must get the drive
           Lodsb ; Otherwise, grab drive spec
           And AL, 80h ; Capitalize drive letter
           Jmp And SkipSeveDrive ; And skip next section

GetDrive: Nov AH, 19h ; Get current drive
; (Figure 1 continues)
```

Figure 1: The assembly language program for NO.COM.



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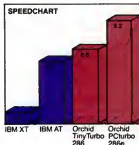
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## ■ PROGRAMMING/UTILITIES

```

Int      21h                ; through DOS
Add      AL, 'A'            ; Convert to letter
Mov      AH, ':'            ; Colon after drive letter

SaveDrive:  Stosw                ; Save drive spec and colon
            Mov                ; Directory divider byte
            Cmp                ; See if spec starts at root
            Jz      HaveFullPath ; If so, no need to get path
            Stosb                ; Store that character
            Push     SI          ; Save pointer to parameter
            Mov      DI          ; Destination of current path
            Mov      DX, [SI - 3] ; Drive letter specification
            Sub      DX, '8'     ; Convert to number
            Mov      AH, 47h     ; Get current directory
            Int      21h         ; through DOS
            Mov      DX, Offset FileSpecMsg ; Possible error message
            Jc      ErrorExit    ; Set it error
            Sub      AL, AL      ; Search for terminating zero
            Cmp      [SI], AL    ; Check if Root Directory
            Jz      RootDir      ; If so, don't use it
            Mov      CX, 64      ; Number of bytes to search
            Repne    Scasb       ; Do the search
            Dec      DI          ; DI points to last zero
            Mov      AL, '\\'    ; Put a backslash in there
            Stosb                ; So fileSpec can follow
            Pop      CX          ; End of NO file spec
            Sub      CX, BX      ; Number of bytes to transfer
            Sbb      Movsb       ; Transfer them
            Sbb      Stosb       ; Terminating zero
            Mov      [FileList], DI ; Repository for found files

; -----
; File up parameter and ParamBlock for eventual COMMAND load
; -----
            Sub      BX, 4       ; Points to new param begin
            Mov      AL, [Parameter] ; Old byte count of parameter
            Add      AL, 89h     ; Add beginning of old param
            Sub      AL, BL      ; Subtract beginning of new
            Mov      AH, ' '     ; Space separator
            Mov      Word Ptr [BX], AX ; Store it
            Mov      Word Ptr [BX + 2], 'C/' ; Add /C to beginning of rest
            Mov      AX, [Environment] ; Get environment segment
            Mov      [ParamBlock], AX ; Save it
            Mov      [ParamBlock + 2], BX ; Save parameter pointer
            Mov      [ParamBlock + 4], CX ; Save segment of ParamBlock
            Mov      [ParamBlock + 8], CS ;
            Mov      [ParamBlock + 10], CS ;

; -----
; Find File from NO File Specification
; -----
            Nov      DX, Offset DTABuffer ; Set File Find buffer
            Nov      AX, 1Ah     ; by calling DOS
            Int      21h

            Nov      DI, [FileList] ; Address of destination
            Nov      DX, Offset FullPath ; Search string
            Sub      CX, CX      ; Search Normal file only
            Nov      AH, 47h     ; Find first file

FindFile:   Int      21h         ; Call DOS to find file
            Jnc      Continue    ; If no error continue
            Jc      Jz          ; If no more files
            Jz      NoMoreFiles  ; get out of the loop
            Nov      DX, Offset FileSpecMsg ; Error message otherwise
            Jmp      ErrorExit    ; Set and print message

Continue:   Nov      AX, DI      ; Address of destination
            Add      AX, 512     ; See if near top of segment
            Jc      TooManyFiles ; If so, too many files
            Cmp      AX, SP      ; See if getting too many
            Jb      StillOK      ; If not, continue

TooManyFiles: Nov      DX, Offset TooManyMsg ; Otherwise error message
            Jmp      ErrorExit    ; And terminate
  
```

(Figure 1 continues)

with a DIR command because DIR ignores hidden files. You can't RENAME, COPY, or DELETE them. But they're on the disk, nonetheless. Some copy-protection schemes also use hidden files.

NO protects the files specified by the first argument from the command or program specified by the second argument by temporarily hiding the files. This is done through the DOS CHMOD Function Call

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## ■ PROGRAMMING/UTILITIES

```

StillDK:  Mov     SI, 30*Offset DTABuffer ; Points to filename
          Call    AsciiTransfer          ; Transfer it to list
          Inc     [PileCount]            ; Kick up counter
          Mov     AX, 47h                ; Find next file
          Jmp     FindFile               ; By looping around

NoMoreFiles:  Mov     [PileListEnd], DI ; Points after last file
             Mov     DI, [PileList]     ; Points to end of find string
             Mov     CX, 64             ; Search up to 64 bytes
             Mov     AL, '\h'           ; For the backslash
             Std                     ; Search backwards
             Repts  Scash               ; Do the search
             Mov     Byte Ptr [DI + 2], 0 ; Stick zero in there
             Cld                     ; Fix up direction flag

;
; Stop Ctrl-Break Exits and Hide the files
;-----
             Mov     AX, 3300h          ; Get Break State
             Int     21h                ; By calling DOS
             Mov     [BreakState], DL   ; Save it
             Sub     DL, 0h             ; Set it to DFF
             Mov     AX, 3301h          ; Set Break State
             Int     21h                ; By calling DOS
             Mov     BL, 0FFh           ; Value to AND attribute
             Mov     BH, 02h           ; Value to OR attribute
             Call    ChangeFileMode    ; Hide all the files

;
; Un-allocate rest of memory
;-----
             Mov     BX, [PileListEnd] ; Beyond this we don't need
             Add     BX, 512            ; Allow 512 bytes for stack
             Mov     SP, BX             ; Set new stack pointer
             Add     BX, 15             ; Prepare for truncation
             Mov     CL, 4              ; Prepare for shift
             Shr     BX, CL             ; Convert to segment form
             Mov     AH, 4Ah            ; Shrink allocated memory
             Int     21h                ; By calling DOS
             Mov     DX, Offset MemAllocMsg ; Possible Error Message
             Jc      ErrorExit2         ; Print it and terminate

;
; Search for Compsec in Environment
;-----
             Push    ES                 ; We'll be changing this
             Mov     ES, [Environment] ; Set ES to Environment
             Sub     DI, DI             ; Start at the beginning
             Mov     SI, Offset ComSpec ; String to search for
             Mov     DX, Offset CommandMsg ; Possible error message

TryThis:    Cmp     Byte Ptr ES:[DI], 0 ; See if points to zero
             Jz      ErrorExit2         ; If so, we can't go on
             Push    DI                 ; Temporarily save these
             Mov     CX, 0              ; Search string has 0 chars
             Repts  Cmpsb               ; Do the string compare
             Pop     DI                 ; Get back the registers
             Jz      ErrorExit2         ; If equals, we've found it
             Sub     AL, AL             ; Otherwise search for zero
             Mov     CX, -1             ; For 'infinite' bytes
             Repts  Scash               ; Do the search
             Jmp     TryThis            ; And try the next string

;
; Load COMMAND.COM
;-----
LoadCommand: Add     DI, 0              ; so points after 'COMSPEC'
             Push    DS                 ; Switch DS and ES registers
             Push    ES
             Pop     ES
             Pop     DS
             Mov     [StackPointer], SP ; Save Stack Pointer
             Mov     DX, DI             ; DS:DX = Ascii of COMMAND
             Mov     BX, Offset ParamBlock ; ES:BX = parameter block
             Mov     AX, 4B00h          ; EXEC function call

```

(Figure 1 continues)

43h. NO then loads a secondary version of COMMAND.COM (via the DOS EXEC Function Call 4Bh) and passes to it only the command following the NO file specification. (This could be another NO com-

mand if you're nesting them, as shown in the earlier examples.) After the command finishes, COMMAND.COM returns control to NO. NO then unhides the files and terminates.

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## PRODUCTIVITY

### ■ PROGRAMMING/UTILITIES

```

Int      21h                      ; Load command processor
;
; Return from COMMAND.COM
;
Mov      AX, C6                   ; Current code segment
Mov      DS, AX                   ; Reset DS to this segment
Mov      SS, AX                   ; Reset SS to this segment
Mov      SP, [StackPointer]      ; Reset SP
Pushf    ; Save error flag
Mov      DL, DL                   ; Set Ctrl Break to OFF
Int      21h                      ; By calling DOS
Popf     ; Get back error flag
Mov      DX, Offset CommandMsg    ; Set up possible error msg
Jnc      Terminate                ; And print if EXEC error
;
; Unhide the Files, restore Ctrl-Break state, and exit
;
ErrorExit: Mov      AH, 9          ; Will print the string
Int      21h                      ; Print it
Terminate: Mov      SL, 0FDh       ; AND value for change
Mov      BH, 00h                 ; OR value for change
Call     ChangeFileMode          ; Change file attributes
Mov      DL, [BreakState]        ; Original break-state
Mov      AX, 3301h               ; Change the break-state
Int      21h                      ; by calling DOS
Int      20h                      ; Terminate
;
; SUBROUTINE: Change File Mode (All files, DL = AND, BH = OR)
;
ChangeFileMode: Mov      CX, [FileCount] ; Number of files
Jczz     EndOfChange             ; If no files, do nothing
Mov      SI, [FileList]          ; Beginning of list
Mov      DX, [FileListEnd]       ; End of List
Push     SI                      ; Save pointer
Mov      SI, Offset FullPath      ; Preceding path string
Mov      DI, [DestName]           ; Destination of full name
Call     AsciiTransfer            ; Transfer it
Dec      DI                      ; Back up to end zero
Pop      SI                      ; Get back pointer to filename
Call     AsciiTransfer            ; Transfer it
Push     CX                      ; Save the counter
Mov      AX, 4300h                ; Get attribute
Int      21h                      ; by calling DOS
And      CL, BH                  ; AND with BH
Or       CL, BH                  ; OR with BH
Mov      AX, 4301h                ; Now set attribute
Int      21h                      ; by calling DOS
Pop      CX                      ; Get back counter
Loop     ChangeLoop              ; And do it again if necessary
EndOfChange: Ret
;
; SUBROUTINE: Ascii String Transfer (SI, DI in, returned incremented)
;
AsciiTransfer: Mov      Byte Ptr [DI - 1], 0 ; Transfer Byte
Cmp      Jns      AsciiTransfer ; See if it was end
Ret      ; If not, loop
; Or leave subroutine
;
; Variable length date stored at end
;
DTABuffer Label Byte ; For file find calls
FullPath equ      DTABuffer + 43 ; For file path end names
CSEG     EndS ; End of the segment
End      Entry ; Denotes entry point

```

(Figure 1 ends)

When I first got DOS 2.0 and read the section in the manual called "Loading a Secondary Command Processor," I wondered: What on earth could that be used for? It seemed like just a slick trick in search of an application. Well, this is my third program that loads a secondary command processor. The first two were DDIR (PC Magazine, Volume 4 Number 20) and

SWEEP (PC Magazine, Volume 4 Number 23). The applications are now very obvious.

Loading a secondary command processor gives a program the wherewithal to change the normal workings of other commands. DDIR loads COMMAND.COM to execute a DIR command but intercepts the screen output to reformat it into two al-

phabetically sorted columns. SWEEP repeatedly loads COMMAND.COM to execute a single command or program over all nested subdirectories.

You can use NO with both DDIR and SWEEP. (Both of these other programs are also available through PC-IRS.) For instance, to get a double-column directory of all the files in a subdirectory except the .BAS files, execute

```
NO *.BAS DDIR
```

To do the same thing for all subdirectories on a hard disk, use the command

```
SWEEP NO *.BAS DDIR
```

SWEEP executes the command line that follows the word SWEEP through all nested subdirectories. NO hides files (in this case \*.BAS) and executes the command that follows the \*.BAS file specification. The DDIR program lists the double-column directory. It returns control to NO, which unhides the files. NO then returns control to SWEEP, which goes on to the next subdirectory. At the height of this command, four versions of COMMAND.COM have been loaded—your original and the three loaded by SWEEP, NO, and DDIR.

Loading secondary command processors does pose a few limitations. Since NO must load COMMAND.COM, this adds another disk access to the command. If your COMSPEC variable doesn't point to the subdirectory where COMMAND.COM is located (you can check this by executing the SET command), then NO will terminate with an error. The secondary command processor also requires some additional memory. If you have only 256K and some resident programs and you try to execute NO from the BASICA SHELL command, it's quite possible there will not be enough memory for COMMAND.COM to load.

Loading a secondary version of COMMAND.COM also wipes out the previously typed command line. After NO finishes, you can't recall the command line with the DOS editing keys, such as F3.

**THE BIG EXCEPTION** NO will not work right with the PC-DOS BACKUP program, so if you want to avoid trouble, don't even try it.

```
100 REM -- BASIC PROGRAM TO CREATE NO.COM
110 OPEN "no.com" AS #1 LEN = 1
120 FIELD #1, AS AS
130 CHECKSUM = 0
140 FOR I% = 1 TO 92
150   LINE$M% = 0
160   FOR J% = 1 TO 8
170     READ BYTE%
180     CHECKSUM = CHECKSUM + BYTE%
190     LINE$M% = LINE$M% + BYTE%
200     IF (BYTE% < 256) THEN LSET AS = CHR$(BYTE%)
210   PUT #1
220 NEXT J%
230 READ LINE$CHECK%
240 IF LINE$CHECK% <> LINE$M% THEN PRINT "Error in Line";200 + 10 * I%
250 NEXT I%
260 CLOSE
270 IF CHECKSUM = 74578 THEN PRINT "Successful Completion!" : END
280 PRINT "COM file is not valid!" : END
290 DATA 233, 0, 1, 67, 111, 112, 121, 114, 767
300 DATA 105, 103, 104, 116, 32, 49, 57, 56, 622
310 DATA 54, 98, 105, 102, 102, 45, 68, 598
320 DATA 97, 110, 105, 115, 32, 80, 117, 98, 762
330 DATA 100, 105, 115, 104, 105, 110, 103, 32, 782
340 DATA 67, 111, 46, 26, 32, 80, 114, 111, 507
350 DATA 183, 114, 97, 109, 105, 102, 100, 32, 765
360 DATA 98, 111, 32, 67, 104, 97, 114, 100, 741
370 DATA 101, 125, 32, 80, 101, 116, 122, 111, 770
380 DATA 100, 100, 32, 26, 83, 121, 110, 116, 696
390 DATA 97, 120, 58, 32, 78, 79, 32, 102, 598
400 DATA 105, 100, 101, 115, 112, 110, 99, 32, 773
410 DATA 99, 111, 109, 109, 97, 110, 100, 32, 767
420 DATA 91, 112, 97, 114, 97, 109, 101, 116, 837
430 DATA 101, 114, 115, 93, 36, 78, 79, 50, 674
440 DATA 12, 78, 101, 101, 100, 115, 32, 68, 627
450 DATA 79, 83, 32, 58, 46, 48, 32, 43, 413
460 DATA 36, 78, 79, 50, 32, 73, 110, 99, 565
470 DATA 111, 114, 114, 101, 99, 116, 32, 78, 757
480 DATA 105, 100, 101, 32, 83, 112, 101, 99, 741
490 DATA 36, 78, 79, 58, 32, 84, 111, 111, 589
500 DATA 32, 109, 97, 110, 121, 32, 102, 105, 788
510 DATA 100, 101, 115, 32, 116, 111, 32, 104, 719
520 DATA 105, 100, 101, 36, 78, 79, 58, 32, 509
530 DATA 65, 100, 105, 111, 99, 97, 116, 105, 889
540 DATA 111, 110, 32, 80, 114, 111, 98, 100, 643
550 DATA 101, 109, 36, 78, 79, 58, 32, 67, 568
560 DATA 79, 77, 77, 65, 78, 68, 32, 80, 556
570 DATA 114, 111, 99, 108, 101, 109, 36, 9, 686
580 DATA 32, 44, 59, 61, 8, 8, 8, 8, 196
590 DATA 8, 8, 8, 67, 79, 77, 83, 80, 386
600 DATA 69, 67, 61, 8, 8, 8, 8, 8, 197
610 DATA 8, 92, 8, 8, 8, 100, 8, 8, 200
620 DATA 8, 8, 8, 100, 46, 285, 33, 68, 526
630 DATA 2, 115, 23, 106, 117, 1, 100, 9, 633
640 DATA 285, 33, 285, 32, 172, 68, 13, 116, 836
650 DATA 245, 191, 231, 1, 105, 5, 0, 242, 1100
660 DATA 174, 195, 106, 76, 1, 190, 129, 0, 951
670 DATA 252, 232, 255, 116, 251, 139, 222, 1699
680 DATA 75, 232, 224, 255, 117, 251, 78, 135, 1367
690 DATA 243, 191, 11, 4, 128, 124, 1, 50, 760
700 DATA 117, 5, 173, 36, 223, 235, 8, 100, 977
710 DATA 25, 285, 33, 4, 65, 100, 58, 171, 741
720 DATA 176, 92, 56, 4, 116, 35, 178, 86, 735
730 DATA 139, 247, 138, 84, 253, 120, 234, 64, 1287
740 DATA 100, 71, 205, 33, 106, 137, 1, 114, 927
750 DATA 165, 42, 56, 106, 163, 1, 109, 5, 169
760 DATA 64, 8, 242, 174, 79, 176, 92, 170, 997
770 DATA 94, 139, 203, 43, 286, 243, 164, 42, 1134
780 DATA 192, 170, 137, 62, 236, 1, 132, 235, 1164
790 DATA 4, 168, 120, 8, 4, 128, 42, 195, 661
800 DATA 100, 32, 137, 7, 199, 71, 1, 47, 775
810 DATA 67, 161, 44, 0, 163, 251, 1, 137, 824
820 DATA 30, 253, 1, 140, 14, 255, 1, 140, 834
830 DATA 14, 3, 140, 14, 5, 2, 186, 366
840 DATA 224, 3, 100, 26, 28, 33, 139, 62, 872
850 DATA 236, 1, 106, 11, 4, 43, 201, 100, 862
860 DATA 78, 205, 33, 115, 11, 61, 18, 0, 521
870 DATA 116, 37, 106, 137, 1, 233, 62, 255, 1027
880 DATA 139, 199, 5, 8, 106, 163, 1, 233, 45, 942
890 DATA 196, 114, 6, 106, 163, 1, 233, 45, 942
900 DATA 255, 190, 254, 3, 232, 233, 0, 255, 1422
910 DATA 6, 230, 1, 100, 79, 235, 210, 137, 1086
920 DATA 62, 248, 2, 139, 62, 236, 1, 185, 926
930 DATA 64, 8, 176, 92, 253, 242, 174, 198, 1199
```

Figure 2: A BASIC program that will create NO.COM.

(Figure 2 continues)

## ■ PROGRAMMING/UTILITIES

948 DATA	69,	2,	8,	252,	184,	8,	51,	285,	763
950 DATA	33,	136,	22,	242,	1,	42,	218,	184,	678
960 DATA	1,	51,	285,	33,	179,	255,	183,	2,	909
970 DATA	232,	134,	8,	139,	38,	248,	1,	129,	905
980 DATA	195,	8,	2,	139,	227,	131,	195,	15,	904
990 DATA	177,	6,	211,	235,	168,	74,	285,	33,	1119
1000 DATA	186,	188,	1,	114,	86,	6,	142,	6,	729
1010 DATA	44,	8,	43,	255,	198,	243,	1,	186,	962
1020 DATA	211,	1,	38,	128,	61,	8,	116,	67,	622
1030 DATA	86,	87,	185,	8,	8,	243,	166,	95,	678
1040 DATA	94,	116,	9,	42,	192,	185,	255,	255,	1140
1050 DATA	242,	174,	235,	239,	131,	199,	8,	38,	1249
1060 DATA	6,	31,	7,	137,	38,	9,	2,	139,	369
1070 DATA	215,	187,	251,	1,	184,	8,	75,	285,	1119
1080 DATA	32,	148,	288,	142,	216,	142,	192,	142,	1287
1090 DATA	288,	139,	38,	9,	2,	156,	42,	218,	804
1100 DATA	184,	1,	51,	285,	33,	157,	186,	211,	1020
1110 DATA	1,	115,	4,	188,	9,	285,	33,	179,	726
1120 DATA	253,	183,	8,	232,	11,	8,	138,	22,	639
1130 DATA	242,	1,	184,	1,	51,	285,	33,	285,	922
1140 DATA	32,	139,	14,	238,	1,	227,	48,	139,	838
1150 DATA	54,	236,	1,	139,	22,	248,	1,	86,	779
1160 DATA	158,	11,	4,	139,	258,	232,	24,	8,	858
1170 DATA	79,	94,	232,	19,	8,	91,	184,	8,	689
1180 DATA	67,	285,	33,	34,	283,	19,	287,	184,	943
1190 DATA	1,	67,	285,	33,	89,	226,	224,	195,	1840
1200 DATA	164,	128,	125,	255,	8,	117,	249,	195,	1233

(Figure 2 ends)

Unlike most other DOS commands, BACKUP finds hidden files and backs them up along with everything else. However, BACKUP stores the attribute of the file on the disk, so if you BACKUP a hidden file and then RESTORE it, the file will be restored as a hidden file.

This means if you use NO with BACKUP, it will still back up the files you've attempted to hide from BACKUP, but when it RESTORES them, the originals will be written over with the hidden versions. This is not what you want.

NO will also not hide files from the CHKDSK /V command, which lists all files including hidden files. If you have other programs that find hidden files, NO will not work with these programs either.

**BE CAREFUL SAYING NO** You'll have to follow some minor precautions when working with NO, particularly if you use it with DEL. Most important, remember that NO does not try to figure out what command you're running with it or the file specification of that command. For instance, if you are not in your BASIC subdirectory, this command does not do what you want it to:

```
NO *.BAS DEL 'BASIC'.*
```

This command will protect all the .BAS files in your current directory and then delete everything in your BASIC directory! Instead, use this command:

```
NO 'BASIC'*.BAS DEL 'BASIC'.*
```

Better yet, switch to the BASIC subdirectory before you do anything drastic to it.

The same kind of syntactical care that applies to different subdirectories must be applied when you access a different drive. If, for example, you are on drive C: and enter

```
NO *.DOC NO *.ASM COPY A:.*
```

you will not exclude the .DOC and .ASM files on drive A: from the subsequent copying process. To do so, you should have entered

```
NO A:*.DOC NO A:*.ASM COPY A:.*
```

Again, as with subdirectories, the better alternative is to switch to drive A: and enter the following line:

```
NO *.DOC NO *.ASM COPY *.*, C:
```

You may also have a problem if you experience a parity check error, a blackout, or some other system crash between the time NO hides the files and NO unhides the files. When you finally get back on your PC, it may appear as if the files you NOed out are gone. They are not gone—they're only hidden, and that's why you can't see them with the DIR command. To cover this eventuality, I've also included a program called REVEAL.COM that lets you unhide files independently of NO. Keep it around in case the gremlins strike (or if you want to find those *(expletive deleted)* hidden files used by, but not documented by, copy "protection" schemes —Edj).

**NO ERROR MESSAGES** NO has several possible error messages. Since it works in conjunction with other programs, I've made sure that these error messages are always identified with "NO," so you'll know where they're coming from.

If you load NO without any parameters (or with a carriage return following the file specification), you'll get a little help message telling you the correct syntax:

```
Syntax: NO filespec command [parameters]
```

If you get the message "NO: Needs DOS 2.0+", it means you're using DOS 1.1, which is an obsolete version of PC-DOS. The message "NO: Incorrect File Spec" will most likely result from an invalid drive or subdirectory name in NO's file specification.

NO stores all the names of the files it hides in memory so that it can later unhide them after getting control back from COMMAND.COM. If it does not have enough memory for these filenames, you'll get hit with the message "NO: Too many files to hide." It is unlikely you'll ever see this message unless you're trying to run NO with very limited memory in a multitasking environment such as *Microsoft Windows*. If DOS returns an error code when deallocating memory in preparation for loading COMMAND.COM (another unlikely situation), it will display the message "NO: Allocation Problem." The message "NO: COMMAND Problem" means it wasn't able to load COMMAND.COM. This will happen if COMMAND.COM is not available on-disk or if not enough memory is available to load it.

In each of these cases, NO will bow out gracefully. If it has already hidden the files, it will unhide them before it terminates. NO also turns off Ctrl-Break exiting (which you may have set by using the BREAK ON command) when hiding or unhidden the files. Otherwise, you could possibly break out of the program while some files were still hidden. NO restores the Ctrl-Break flag to its original value before it exits.

NO does not provide a message if it can't find any files to hide. Such a message would, at any rate, be purely informative. Terminating the program because there were no files to hide would make NO difficult to use in a batch file.

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## ■ PROGRAMMING

```

DEBUG
-A
XXXX:0100 MOV SI,00
XXXX:0103 MOV DI,[SI]
XXXX:0105 SUB 05,00
XXXX:0107 MOV BYTE PTR [BX+SI+1],0
XXXX:0108 MOV DX,02
XXXX:010E MOV AX,4300
XXXX:0111 INT 21
XXXX:0113 AND CL,FD
XXXX:0116 MOV AX,4301
XXXX:0119 INT 21
XXXX:011B INT 20
XXXX:011D
-W REVEAL.COM
-R CX
CX 0000
:ID
-W
Writing 0010 bytes
-Q

```

Figure 3: REVEAL.COM will unhide any hidden files found by CHKDSK IV.

**IN CASE OF GREMLINS** That wonderful "Parity Check" message that appears when a memory chip fails has a way of popping up on the screen at precisely the wrong moment. If a parity error or black-out or other system crash occurs in the middle of the NO command, you may be in for a surprise when you get your PC powered back up: a DIR command may not list the files specified in the NO command.

If this happens to you when using NO, stay calm. The files are not gone. All that has happened is that NO did not have an opportunity to unhide the files, and they are still hidden. If you execute a CHKDSK /V, you'll see them listed, so you'll know they're still on the disk.


Figure 3 shows a very short program you can create with DEBUG, called REVEAL.COM. REVEAL will unhide hidden files. The syntax is

REVEAL filename

Because REVEAL is a very simple program, one and only one space must separate the word REVEAL from the filename. It does not indicate errors. If the file is there when you do a DIR command, it worked.

A more extensive program to control file attributes is in the planning stages for a Future Programming/Utilities column. Stay tuned.

Charles Petzold is a contributing editor of PC Magazine.



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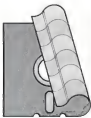
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CIRCLE 361 ON READER SERVICE CARD



■ EDITED BY JARED TAYLOR

# SPREADSHEET CLINIC



*This forum lets readers exchange the ingenious solutions and timesaving hints that make their spreadsheets and integrated software packages work better.*

## BINARY CONVERSIONS

Figure 1 contains a macro I have written to set up a *Symphony* or *1-2-3* worksheet to convert decimal numbers into binary. You need run the macro only once, and it will produce the conversion table shown in Figure 2. At that point, you no longer need the macro and can erase it. Now, when you put a decimal number in cell A1, the binary equivalent will appear in column C. You read the binary number (most significant to least significant digit) from bottom to top.

There are obvious ways to make the output more readable, such as by stringing the digits out horizontally, but to do this you sacrifice speed and simplicity. Besides, in this form, the binary number can be used to improve *1-2-3* and *Symphony* menus. You can do this by writing IF statements, such as  $(\text{if } \text{A1} + \text{C12} = 1, \dots)$ , that refer to cells in column C. This way each cell becomes a software toggle that can change the macro execution path or trigger other macros. The 20 digits that the conversion table generates give you slightly more than 130,000 possible combinations.

Robert L. Donaghy  
Euclid, Ohio

*It's not clear to me how this system will work in a menu. After all, there are many different decimal numbers that could cause cell C12 to be equal to 1, so you would have to set up OR and AND conditions to detect a specific decimal number. However, both the installation macro and the conversion algorithm are very good.*

```
{goto}a2".5"[down]
+a2*2"[right]
+A3* (+SA51/A3-@INT(SA51/A3)) "[right]
+1E (+b3=b4,0,1)"
[got]a4"/ca3.c3*a4.c28"
[goto]c28"END"
```

Figure 1: A macro to set up a decimal-to-binary conversion table.

	A	B	C
2	0.5		
3	1		
4	2		
5	4		
6	8		
7	16		
8	32		
9	64		
10	128		
11	256		
12	512		
13	1024		
14	2048		
15	4096		
16	8192		
17	16384		
18	32768		
19	65536		
20	131072		NA

Figure 2: The conversion table created using the macro shown in Figure 1.

## UNEQUAL NUMBERS

I have found that in *1-2-3* the same number created in different ways is not always treated by the program as being equal to itself. Consider the following ways of making a column of numbers from 0 to 9.9 using increments of 1/10th:

(A) /Data Fill Start 0 Step .1

(B) Enter 0 in the first cell (say B1) and the formula  $B2=B1+.1$  in the cell below, and copy that formula down the column.

(C) /Data Fill Start 0 Step 1 (up to 99) in one column and then divide these numbers

by 10 in the next column.

(D) Enter numbers at the keyboard.

You would expect each of these procedures to result in an identical column of numbers. In fact, however, only methods C and D produce exactly the same results. For example, these are the exact values for 5.3 (to 15 decimal places) for each of the methods:

- (A) 5.3000000000000002
- (B) 5.299999999999999
- (C) 5.3000000000000001
- (D) 5.3000000000000001

For most purposes, of course, these differences are meaningless. However, if you use numbers in a table lookup or in logical operators ( $A5=B5$ , etc.), you may get errors. In order to avoid this problem, be careful how you construct numbers, or use  $\text{@round}$  on decimals when it is important that *1-2-3* regard them as equal.

David Strom  
Creve Coeur, Missouri

*Astonishing but true. It's especially perplexing that 5.3 entered at the keyboard should actually be 5.3000000000000001. Even if you enter 5.3000000000000000 (15 decimal places) you still end up with 5.3000000000000001. And if you actually enter 5.3000000000000001 you will get 5.3000000000000002!*

## DATE CONVERSIONS

I use *1-2-3* a lot for form letters and schedules. Since the *1-2-3* date format (24-Feb-85) can be inappropriate for a letter, I wrote the macro shown in Figure 3 to con-

## ■ SPREADSHEET CLINIC

	A	B	C	D
1	1	31-Jan-86	10	{GOTO}A10*B4"
2	2	YEAR(B1)	86	{EDIT}{CALC}"
3	3	MONTH(B1)	1	/XIB3=1" {EDIT} {HOME}January "
4	4	DAY(B1)	31	/XIB3=2" {EDIT} {HOME}February "
5	5			/XIB3=3" {EDIT} {HOME}March "
6	6			/XIB3=4" {EDIT} {HOME}April "
7	7			/XIB3=5" {EDIT} {HOME}May "
8	8			/XIB3=6" {EDIT} {HOME}June "
9	9			/XIB3=7" {EDIT} {HOME}July "
10	10	January 31, 1986		/XIB3=8" {EDIT} {HOME}August "
11	11			/XIB3=9" {EDIT} {HOME}September "
12	12			/XIB3=10" {EDIT} {HOME}October "
13	13			/XIB3=11" {EDIT} {HOME}November "
14	14			/XIB3=12" {EDIT} {HOME}December "
15	15			/XIB2=85" {EDIT}, 1985"
16	16			/XIB2=86" {EDIT}, 1986"
17	17			/XIB2=87" {EDIT}, 1987"

Figure 3: A macro that changes Lotus-format dates to regular notation.

vert dates to the more normal form, that is, February 24, 1985. The formulas entered as labels in cells A1..A4 are not necessary; they are displayed only to show what is contained in cells B1..B4. Cell B1, the date cell to be converted to formal notation, can be any date, but in this case is @today. Run the macro with Alt-D to get the results in cell A10.

Timothy Frushour  
Glenn Ellyn, Illinois

### EDITING FILENAMES

I've discovered a way to edit 1-2-3. Version 2, filename paths that I would like to pass on. My usual path structure is something like

c:\m:\rectory\subd\rectory\subd\rectory\filname.xls

I back up files by saving them to the current drive first and then immediately to another drive, with the same path and filename. The first part is easy: /File Save does the job. However, if you want to use the same path and filename to save to another drive, you have to hit Escape and then retype the whole thing, even if all you want to change on the /File Save command line is the disk drive letter (C: to D:, for example). This is cumbersome if you're working with long paths. The following technique is much easier.

First, save your worksheet on the current drive, using /File Save as before. To back up the worksheet on another drive, type /FS again. Then hit the Space bar, Backspace, and Home. This will take you to the beginning of the path. Hit Delete to

get rid of C: and type in the letter of the new drive. Hit Return to save the file.

Joseph Marangelli  
Hamden, Connecticut

*When you give the /File Save command and 1-2-3 presents you with a path and filename, you are not automatically in Edit mode. Hitting F2 won't get you into Edit mode, either—all you will get is a beep. The Space-Backspace combination is a makeshift way to get into Edit so that you can use Home, Shift-Tab, and so on for selective editing.*

### FINDING THE CURRENT CURSOR LOCATION

The macro shown in Figure 4 puts the current address of the cursor in the cell named SCRATCH. This can be very useful when you write macros, because the current cursor location can then be used to make decisions about further macro processing.

Joel Katz  
Arlington, Virginia

INSTRUCTIONS	
1.	Name first cell in macro X
2.	Name a cell "SCRATCH"
3.	Put cursor anywhere except in macro
4.	Run macro (Alt+F)
5.	Current cursor location will appear in "SCRATCH"
/rngLOCATE" {he}"	
{goto}SCRATCH"	
"LOCATE"	
{edit}{home}{del}"	
{goto}LOCATE"	
Name current cell "LOCATE"	
Goes to worksheet called "SCRATCH"	
Adds contents of range "LOCATE"	
Edits formula leaving only cell location of "LOCATE"	
Returns to current cell position	

Figure 4: This macro reports the current cursor address.

### WORKSHEET VERSUS FILE SIZE

Recently, I was surprised to get a Memory Full message when I tried to load a 1-2-3 file that was quite small. To track down the cause, I ran a little experiment. First, I used /Worksheet Status and found that I have 230,000 bytes in spreadsheet memory available on my computer when the worksheet is empty. Then I built two simple spreadsheets, as follows:

1. I went to cell BA500 in an empty worksheet and entered the value 1. I now had spreadsheet memory of 130,000, so I assumed my worksheet size would be 100,000 (230,000 - 130,000 = 100,000). I then saved the worksheet and found that the file size was 1,280 bytes.

2. I copied the value 1 to the entire range of A1..BA500. I still had available memory of 130,000, so I assumed that the worksheet size was still 100,000. However, when I saved the worksheet, the file size was 292,864.

Interesting! The internal memory required for the spreadsheets is the same whether I enter a value in a single cell at the end of the active area or I fill all the cells with values. The difference shows up when I save them. The worksheet with only one entry shrinks from 100,000 to a file size of 1,280. I assume this dramatic reduction occurs because the blank cells are packed. The worksheet that is full of values grows from a worksheet of 100,000 to a file of 292,864.

Chuck McLean  
Tacoma, Washington

*This experiment shows 1-2-3 both at its best and at its worst. When the program saves a worksheet to disk, it's smart enough to pack the blank cells and save space. However, when the same work-*

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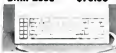
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sheet is in RAM, 1-2-3 wastes memory by keeping track of blank cells as if they had something in them. The new release of 1-2-3 is as efficient with memory as it is with disk space.

Even if Version 1A uses memory inefficiently, it's curious that cells containing a single value should take up no more memory than cells containing nothing. Of course, if you replaced the 1s in the second spreadsheet with formulas, you'd eat up more memory and the disk file would be larger, too.

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I recently installed Lotus/Intel's Above Board memory card in my PC AT. The board comes with a utility program that is supposed to set the proper configuration for your machine. I ran the program according to the manual, but I kept getting

## ■ Programs should warn you if they are going to meddle with your AUTOEXEC.BAT.

memory errors each time I booted.

On investigation, I found that the Lotus/Intel utility program changes (or creates) a CONFIG.SYS file, and it also adds a command to the beginning of your AUTOEXEC.BAT file. My AUTOEXEC.BAT file has a number of commands in it, some of which load RAM-resident programs. I discovered that these commands must be executed before the Above Board

command. The solution is simply to edit the AUTOEXEC.BAT file after running the installation program, making the Above Board command last instead of first.

Brian Shew  
South San Francisco, California

*Programs should warn you if they are going to meddle with your AUTOEXEC.BAT and CONFIG.SYS files.*

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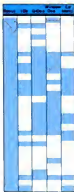
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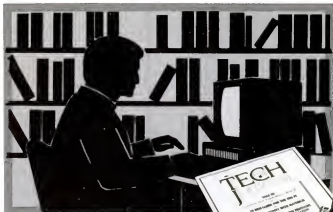
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■ EDITED BY CRAIG L. STARK

# POWER USER



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## FILE DATES AND TIMES IN TURBO PASCAL

Beginning with DOS 2.0, programs can work with files through handles, which are 16-bit integers assigned by DOS at the time a file is opened. When programming in a high-level language, however, there is often no way for the programmer to obtain the file handle, which is necessary for certain operations. Thus, file manipulations are done by means that are invisible to the programmer. Turbo Pascal is such a language.

Although Turbo Pascal 2.0 used the old File Control Block (FCB) DOS calls to work with files, Turbo Pascal 3.0 uses the handle calls. As indicated on page 220 of the Turbo Pascal Version 3.0 *Reference Manual*, the file handle is available as the first word of Turbo's "File Interface Block."

The program HNDLDEMO.PAS (see Figure 1) shows how to use this file handle to get at the file date and time stamp, which otherwise are not available to Turbo programmers. The program requires Version 3.0 of Turbo Pascal. The filename is entered as a command line parameter.

The only real complication of this program results from a feature missing from Turbo Pascal: the unsigned integer. This necessitates checking to see if CX (which returns the file time) is negative and, if so, making the appropriate adjustments before calculating the hour and minute.

AJ Sato  
College Station, Texas

trial for determining a file's date and time. The handle is also necessary for the IOCTL DOS Function Call, which you can use to determine if the file you're working with is actually a disk file or if it's a character device, such as the keyboard, display, or printer.

While most high-level languages do put a heavy layer of protection between the programmer and the DOS file handle, one significant exception is C. (Since DOS 2.0 was greatly influenced by UNIX and C, this is perhaps not surprising.) For instance, in Microsoft C, Version 3.0, the functions open, creat, read, write, close, and others all use file handles within the C program. These C functions, in fact, directly correspond to the DOS function calls that perform these tasks.

AJ Sato admits running into some prob-

lems with breaking register CX into the time components. (In fact, the first version he sent to Power User wouldn't work right for files saved after 4:00 p.m.) I took the liberty of modifying his demonstration program to avoid the problem altogether. However, it may be instructive to take a look at the two approaches so you can avoid the same problems Mr. Sato encountered when working with bit-encoded data.

The DOS Function Call 57h returns the hours, minutes, and seconds of the file save time in register CX. These three components are coded as follows:

```
Bit: F E D C B A 9 8 7 6 5 4 3 2 1 0
Data: H H H H H H H H H H S S S S S
```

where H is the hour from 0 through 23, M is the minutes from 0 through 59, and S is the number of 2-second intervals from 0 through 29.

```
Program Hndldemo;
var
  Filvar: File;
  Handle: Integer absolute Filvar;
  Regs: Record AX, BX, CX, DX, BP, SI, DI, DS, ES, Flags: Integer; End;
  Year, Month, Day, Hour, Minute, Second: Integer;
Begin
  Assign(Filvar, Parametr(1));
  Reset(Filvar);
  With Regs Do Begin
    AX := $5780; {57 hex is the function number for finding file date}
    BX := Handle; {This tells DOS which file we are interested in}
    Msdos(Regs); {Make the actual DOS call}
    Year := 1988 + DX shr 9;
    Month := (DX shr 5) and $F;
    Day := DX and $1F;
    Hour := CX shr 11;
    Minute := (CX shr 5) and $3F;
    Second := (CX and $1F) shl 1;
  End;
  Write('File ', Parametr(1), ' last saved ', Month, '-', Day, '-', Year);
  Write(' at ', Hour, ':', Minute, ':', Second);
  Close(Filvar);
End.
```

Figure 1: A Turbo Pascal 3.0 program that demonstrates how to access the DOS file handle and use it to obtain file date and time information.

Getting access to the file handle is essen-

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## PRODUCTIVITY

## ■ POWER USER

## ■ The DOS Function Call 57H returns the hours, minutes, and seconds of the file save time in register CX.

Mr. Sato's original program calculated the time components, using the following formulas:

```
Hour := CX div 2848 ;
Minute := CX div 32 - 64 * Hour ;
Second := 2 * (CX - 32 * (CX div 32)) ;
```

By using div, Turbo does an integer divide that truncates the fractional part. But notice what happens with a file saved exactly at 4:00 p.m., which is 16:00 in 24-hour format. The value of CX (in hexadecimal) is \$8000, or 32768. However, since integers in Turbo are unsigned, Turbo interprets this as -32768. It then calculates the Hour as -8, which is right in one sense (16:00 is 8 hours before midnight), but doesn't look quite right when displayed.

Mr. Sato took care of this problem by checking to see if CX was negative and, if so, using the following formulas:

```
CX := (CX + 32767) + 1 ;
Hour := CX div 2848 + 16 ;
Minute := CX div 32 - 64 * (Hour - 16) ;
```

(He used the same formula as above to calculate seconds.) This works OK but is hardly what you'd term elegant.

A better approach to stripping out bit-encoded data is through use of shifting and masking, using Turbo's shr and and operators. The corresponding formulas are shown in Figure 1. Fortunately (in this case), Turbo's shr operator does not respect the sign of the integer. That is, -1 (hex \$FFFF) shifted right one bit is a positive 32767 (\$7FFF). Assembly language programmers might note that Turbo uses SHR (logical shift right) instead of SAR (arithmetic shift right).

Besides more clearly indicating what your code is actually doing, shifting and masking are also generally faster and more code efficient. The program shown

in Figure 1 compiles to a 11,537-byte .COM file. Mr. Sato's original version of the program (without the correction for negative hours) was 11,599 bytes. His corrected version was 11,670 bytes.

—Charles Petzold

## USING DEBUG WITH TURBO

Debugging Turbo Pascal programs sometimes presents real problems. Although Turbo's quick edit, compile, and run facilities let you use a "try different approaches until it works" approach to debugging programs, ultimately you may have to trace through the .COM file itself under DEBUG to see what's really happening at the bits and bytes level. However, once you load a Turbo .COM file into DEBUG, you usually have no real idea where your procedures, functions, and variables are located.

Figure 2 shows a demonstration Turbo Pascal program that can ease the process. Using the seg and ofs functions, Turbo can give you the absolute addresses of your functions, procedures, and variables. Once you have these addresses, you can set breakpoints with DEBUG to trace through the code line by line.

The writeln functions at the beginning of the statement part of addprn list the addresses of several procedures and variables (with the standard segment:offset format) using ofs, seg, and hexprn. The hexprn function simply converts an integer to a four-character hexadecimal string. fadd and padd are a simple function and procedure, respectively. The xclsrscr procedure just calls the built-in Turbo clrscr function.

To illustrate, suppose you want to trace through the fadd function. First compile the program into a .COM file within Turbo Pascal. Leave Turbo, load the .COM file under DEBUG, and run it with the G command. This prints out the addresses of the procedures, functions, and variables on the screen. All functions and procedures are in the initial code segment (CS). Data is stored in other segments set after the Turbo program begins running.

If you want to trace through the fadd function, note the offset address, quit DEBUG, and reload the program into DE-BUG again. Now you can use the command

299

## ■ POWER USER

There are two possible solutions to your problem. The cheap and dirty approach is simply to copy `COMMAND.COM` into each of the directories in which you plan to use `XyWrite II Plus`. At the cost of 23K per subdirectory, that will restore the DOS drop-down ability you lost when you changed DOS versions.

After about 10 minutes of frenzied fingerwork, however, Charlie Petzold, the demoniac of `DEBUG`, came up with a much slicker solution. It uses a patch technique applicable to other programs written for DOS 2.1 that encounter a similar difficulty with Version 3.1.

The first step is to make a copy of the program (never patch an original), and the next is to rename it so as to get rid of the `.EXE` extension. Thus, a copy of `EDITOR.EXE` became `EDFIX.XXX`. Next,

```
DEBUG EDFIX.XXX
-r<Enter>
```

returned the four-digit code segment (CS) address (xxxx, the first four digits of a segmented address) and showed the program loaded at xxxx:0100.

Still in `DEBUG`,

```
-s xxxx:0100 eefb "COMMAND.COM"
```

searched the first code segment for the string "`COMMAND.COM`" (which you must be sure to type in uppercase letters). In this case, it returned a couple of hits (four-digit addresses where the string was found, shown as yyyy below). Checking these out with the `D` command, however,

```
-d xxxx:yyyy
```

revealed (looking at the ASCII display in `DEBUG`) that in these cases `COMMAND.COM` was simply part of a `XyWrite` error message (for example, "`COMMAND.COM NOT FOUND`"). False alarm.

`XyWrite II Plus` is a big program, how-

ever: it takes up more than the original 64K code segment (shown as xxxx, above). Adding 1000 to xxxx (which, in my case, happened to be 1E1B) and again searching the whole possible range

```
-s 2E1B:0000 eefb "COMMAND.COM"
```

yielded the vital address. In the case of this computer and this copy of `XyWrite II Plus`,

```
-d 2E1B:0E10
```

showed

```
.....COMMAND.C
O M E X E .....
```

This is the point in the code where `XyWrite II Plus` jumps to `COMMAND.COM` in order to drop back into DOS. In DOS 2.x it could simply follow the declared path back to the root directory to pick up `COMMAND.COM`. DOS 3.x, however, wants programs to look instead at the `COMSPEC` directly. (You can see your `COMSPEC` by typing `SET` any-

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when you could have...

time you're at the DOS prompt. For the change between DOS Version 2.x and 3.x, see the section heading "Version Specific Differences" in the DOS Technical Reference manual.)

To make XyWrite II Plus work properly with DOS 3.x a little additional help is needed at this point, but—and this is crucial—that help must be rendered without changing the number of bytes in the XyWrite code. Using the address locations above (which you would adapt to your own computer/XyWrite combination), Charlie used DEBUG's Enter command thus:

```
-e 2e1b:0818 ":"
```

This changed "COMMAND.COM" into "C:\MAND.COM." After verifying the change by repeating the D command, he then hit w at the prompt (to write the change to disk) and then q (to quit DEBUG). EDFIX.XXX was then renamed

■ One of the most attractive features of XyWrite II Plus is that it lets you drop down into DOS, run other programs, then return to XyWrite.

to the original EDITOR.EXE, and (a vital step) in the root directory (drive C:, here) he entered

```
COPY COMMAND.COM MAND.COM
```

Now when XyWrite needs COMMAND.COM, it knows to go directly to MAND.COM in the root directory of drive C:, and DOS 3.x's attempt to make programs look at the COMSPEC is thwarted. Of course, programs (such as XyWrite II) written after the introduction of DOS 3.0 will use the COMSPEC as IBM intends, but for older programs this ingenious circumvention can be a lifesaver.

—Craig L. Stark

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■ EDITED BY PAUL SOMERSON

# USER-TO-USER



*PC Magazine's readers share their favorite tricks for getting the most horsepower out of DOS, BASIC, and their systems in general.*

## BORDER WARS

The program BORDER.COM in Figure 1 creates a 37-byte utility called BORDER.COM that will make it easy to set your screen border. Create the .COM file, then get into DOS and type

BORDER X

where X is a single hex digit from 0 to F. BORDER 4 yields a red border, for instance, while BORDER E gives you a bright yellow one.

Donald R. Winslow  
San Pedro, California

*This variation of the standard border routine is easy to use because it reads arguments from the command line and lets you change your border to 1 of 15 colors without having to keep 15 tiny files handy.*

While this sets the border on text screens, it will change the background in medium res and the color in high res. After creating BORDER.COM, get into either one of these graphics modes and type

SHELL "BORDER X

where X is a single-digit hex number from 0 to F.

## CUSTOM REBOOTS

The RB reboot program (PC Magazine, Volume 4 Number 24, page 236) is incomplete, since it doesn't let you control the type of boot the computer does. To prove this, start from scratch with your computer just turned on—do not do a Ctrl-Alt-Del reset. If you make a mistake, you'll have to turn your computer off and start over

```
100 ' BORDER.BAS -- by Donald R. Winslow
110 OPEN "BORDER.COM" AS #1 LEN=1:FIELD #1,1 AS D$
120 FOR A=1 TO 37:READ A$:LSET D$=CHR$(VAL("&H"+A$))
130 PUT #1:NEXT:CLOSE:PRINT "BORDER.COM CREATED"
140 DATA BE,82,00,8A,04,3C,30,73,02,B0,30,3C,39
150 DATA 76,0E,3C,41,72,F6,24,DF,3C,46,77,F0,2C
160 DATA 37,EB,02,2C,30,BA,D9,03,EE,CD,20
```

**Figure 1:** Program to create BORDER.COM border-setting routine. To use BORDER.COM, get into DOS and type: BORDER X (where X is a one-digit hex number from 0 to F). This changes the border on text screens, the background in medium-res, and the foreground in hi-res.

again. Get into DOS and load DEBUG, then type the five lines of RB, hitting the Enter key after each:

```
rcs
ffff
rip
0000
g
```

Go get a cup of coffee while you wait for your computer to start, since it will do a cold boot as if you were just powering up.

Now reset your computer with Ctrl-Alt-Del, load DEBUG again, and type in the same five lines of RB. This time your computer will do a warm boot, as if you had typed Ctrl-Alt-Del. The two types of boots are the same except that a cold boot also performs the time-consuming memory tests.

When a PC boots, its BIOS checks a flag word (2 bytes) at location 40:72. If the value of the flag is &H1234, BIOS does a warm boot. If the flag is not &H1234,

```
100 ' BOOTER.BAS -- by William Kraengel
110 ' Makes files to warm and cold boot
120 N$(1)="WARM.COM":N$(2)="COLD.COM"
130 FOR A=1 TO 2:OPEN N$(A) AS #1 LEN=1
140 FIELD #1,1 AS D$:FOR B=1 TO 16
150 READ A$:IF A=1 THEN 170
160 IF B=7 OR B=8 THEN A$="7F"
170 LSET D$=CHR$(VAL("&H"+A$))
180 PUT #1:NEXT:CLOSE:RESTORE:NEXT
190 DATA B8,40,00,8E,D8,B8,34,12
200 DATA A3,72,00,EA,00,00,FF,FF
```

**Figure 2:** BOOTER.BAS program to create WARM.COM and COLD.COM utilities that selectively trigger both warm boots and cold boots.

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# NEC

## ■ USER-TO-USER

BIOS does a cold boot. (Note that if you use DEBUG to look at addresses 40:72 and 40:73, you'll see 34 12 rather than 12 34, since the 8088 stores words backward. The high-order byte (12) goes into the higher memory address (40:73), while the low-order byte (34) goes into the lower memory address (40:72). Despite this, the word takes the lower memory address as its own.)

Rewriting RB to set this flag and allowing for backward word storage, we get

```
e 40:72 34 12
rcb
ffff
rip
0000
g
```

for a warm boot. Replacing 34 12 with 7F 7F performs a cold boot. But rather than use DEBUG to reboot each time, make two 16-byte .COM files called WARM.COM and COLD.COM. To create WARM.COM, type everything as follows:

```
DEBUG
MWARM.COM
A
MOV AX,4B
MOV DS,AX
MOV AX,1234
MOV [72],AX
JMP FFFF:0000
```

```
RCX
10
W
Q
```

To create COLD.COM, change the second line to NCOLD.COM and the sixth line to MOV AX,7F7F. Be sure to leave a space before RCX and hit the Enter key after each line.

Bill Kraengel, Jr.  
Valley Stream, New York

If you have a PC with 640K, a cold boot takes forever as it crawls through the initial power-on self-test (POST). WARM.COM is a far handier program, although it's really just as easy to do the three-finger keyboard salute. The BASIC BOOTER .BAS program in Figure 2 creates both WARM.COM and COLD.COM. at the same time.

## QUICK TEXT CONVERSIONS

Occasionally I have to transfer a .COM or .EXE file via modem to someone who can handle only text file transfers. BINTEXT.BAS, in Figure 3, will convert any binary file into a text file, MAKEBIN.BAT, which can then be transferred as simple text. MAKEBIN.BAT then uses DEBUG to re-create the file from which it was created. This will work for a .COM or .EXE file, .DBF file, .WKS file, or any other non-text file.

BINTEXT.BAS asks for the name of a binary input file on the default drive/directory, then prints periods on the screen while it's converting the binary file to text. The batch file created will always be called MAKEBIN.BAT and will be written to the default drive/directory. MAKEBIN.BAT will be two or three times larger than the original file, so make sure there is room on the disk.

On the receiving end, simply put DEBUG on the same drive or directory as MAKEBIN.BAT and type MAKEBIN at the DOS prompt to re-create the original file. The batch file uses DEBUG to create the original file with a .BIN extension, then rename it to the original filename. If files with either of these two names already exist in the same directory as MAKEBIN, they'll be overwritten—so be careful.

MAKEBIN.BAT starts with the command GOTO END. Most of the rest of the file is a script file that is used as redirected input for DEBUG. Since GOTO END means nothing to DEBUG, you'll see an error message while MAKEBIN.BAT starts running; ignore it.

Matthew Meighan  
Carbondale, Illinois

These days most communications programs can handle binary files—by sending all 8 bits of each byte rather than just the lower 7 used by normal text. Such protocols as Xmodem will handle all the details, including the error checking desired for binary transfers. However, if you're sending a file over a purely text-oriented service like MCI mail, BINTEXT.BAS will work like a charm, so long as the recipient has DEBUG on his disk. Many users never use DEBUG since it sounds overly technical and since IBM for some bizarre reason puts it on the supplemental

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## ■ USER-TO-USER

The first is to patch **FORMAT.COM**, which writes the boot message to disks that it formats. Get into DOS and type

```
DEBUG FORMAT.COM
E YTTY "Put DOS system diskette in Drive A:" D A
E 133 "Press any key to start DOS...."
G
```

substituting the message addresses for the **YYYY** and **ZZZZ** as follows:

```
DOS 2.1 -- YYYY=1515 ZZZZ=153A
DOS 3.1 -- YYYY=2456 ZZZZ=2480
```

The new message will then appear on every disk formatted with this customized version of **FORMAT.COM**.

You can also patch the boot record directly. Get into DOS and type

```
DEBUG
L 0000 1
E YTTY "Put DOS system diskette in Drive A:" D A
E 133 "Press any key to start DOS...."
W 0000 1
G
```

substituting the message addresses for the **YYY** and **ZZZ** as follows:

```
DOS 2.1 -- YYY=182 ZZZ=1A7
DOS 3.1 -- YYY=161 ZZZ=186
```

and substituting the number of the drive for the **N** as follows:

```
N=0 for drive A:
N=1 for drive B:
N=2 for drive C:
N=3 for drive D:
```

Johnny Y. Chin  
San Jose, California

*These two techniques are extremely valuable, especially for power users who are preparing disks for less expert users. **FORMAT.COM** writes the same confusing "Non-system disk or disk error! Replace and strike any key when ready" message to every diskette, even those formatted with the **/S** system option. It's far*

*better to substitute your own friendly message there, and Mr. Chin's submission shows how easy it is.*

*Changing **FORMAT.COM** probably makes more sense, since you can make one patch and have the new boot record written to every diskette you format afterward. However, customizing individual boot records can be useful when you want to add a special message for a particular user.*

*And patching a program like **FORMAT.COM** is far safer than playing with a boot record where you're writing to an absolute sector, especially on hard disk systems. When you use **DEBUG**'s **W(rite)** command, you specify the target drive somewhat counterintuitively: **A** is 0, not 1; **B** is 1, not 2, etc. If you're not careful, you may think you're writing to drive **B**: by specifying a 2, when 2 actually tells **DEBUG** to write to your hard disk **C**: with potentially horrendous results.*

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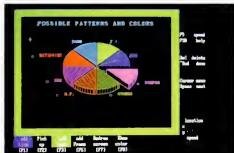


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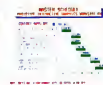


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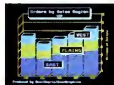
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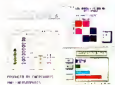
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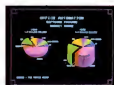
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# PC TUTOR



*The PC Tutor answers your questions on everything from programming and operating systems to hardware and applications software.*

## DELETING UNNEEDED COMPILE FILES

I'm trying to write a batch file to automate compiling with our MS FORTRAN compiler. There are three new files on the disk as a result of the compilation process, .LST, .MAP, and an .OBJ file. I would like to have the option of keeping any one or more of these files with a default of erasing them.

The heart of my problem seems to be in making DOS recognize that no parameter was specified. Currently, the batch file looks like

```
if %2==L goto A
DEL %1.LST
:A
if %2==M goto B
if %3==M goto B
DEL %1.MAP
:B
if %2==O goto C
if %3==O goto C
if %4==O goto C
DEL %1.OBJ
:C
```

where %1 is the file compiled and %2, %3, and %4 are the optional parameters. If I run it now without specifying parameters 2 to 4, it gives me a syntax error message and deletes the files.

Jim Rodden  
Los Altos, California

*You can easily get rid of the syntax errors. You have been getting a syntax error because the statement*

```
if == M goto O
```

*is meaningless (the %2 was replaced by an empty string). The trick lies in getting batch programs to recognize that there are no more arguments. I usually use something like*

```
if %1a == a goto EMPTY
```

*This will look like*

```
if a == a goto EMPTY
```

*if there is no %1.*

*I would therefore simply change your batch program accordingly*

```
if %2A==LA goto A
DEL %1.LST
:A
if %2A==MA goto B
if %3A==MA goto B
DEL %1.MAP
:B
if %2A==OA goto C
if %3A==OA goto C
if %4A==OA goto C
DEL %1.OBJ
:C
```

*This technique will work, of course, not only with your FORTRAN compiler, but with the excess files generated by other compilers, as well.*

## UNREPROGRAMMING FUNCTION KEYS

I've written an applications program in C that reprograms the function keys. This is done by using the facility in ANSI.SYS documented in the DOS Technical Reference manuals.

My problem concerns how to reset the

keys to their original settings after the applications programs have run. I cannot find a solution other than rebooting, which is not acceptable.

Nancy G. Learned  
Boise, Idaho

*When you see the solution, you're going to slap yourself on the head, but I'll confess this same problem stumped me also when I first started using ANSI.SYS.*

*I assume your C program is executing a statement something like this:*

```
printf ("\033[0;68f;"ABC\p") ;
```

*to define (in this instance) F10 to the string ABC. To redefine F10 back to F10, just use the statement*

```
printf ("\033[0;68;0;68p") ;
```

*That is, just define it to its native self.*

*(If you're concerned that the F10 key had previously been redefined through ANSI.SYS and you want to restore that old setting, then you have a more serious problem. You'd have to simulate an F10 keystroke by sticking a word with the F10 scan code in the keyboard buffer in lower memory and then have your program read the keyboard and capture the defined string as it came through ANSI.SYS. This is probably more of a hassle than you want to be bothered with. If some keys had previously been redefined elsewhere—as in a batch file, for example—prior to your applications program's redefining them, it would probably be best to just run that*

## ■ PC TUTOR

batch file again after you're all finished.)

The same technique shown above can be used if you define the function keys in other programming languages or with the ECHO or PROMPT commands. Non-C programmers will want to note that the '033 is the Escape character and the '^' is C's way of embedding double quotes in a string.

### COPY-PROTECTION ANGUISH

I recently put a new hard disk into my machine and reinstalled my applications on it. These applications include eight that are copy protected. Only one of them wanted me to deinstall before reinstalling. No where could I find information about deinstalling in the Microsoft Word 2.0 and Lotus's 1-2-3, Release 2, manuals. I'm pretty paranoid about copy protection. How can I tell if a copy-protection scheme has been messed up by reinstalling? What will happen if I try to run the program?

Dennis G. Mueller  
Huntington Beach, California

*Although you have probably read about some proposed copy-protection schemes that will destroy other data on your hard disk, I have not yet learned of any software manufacturer insane enough to use them. If you encounter a copy-protected program that results in the destruction of data or other programs on your hard disk, the best person to see is a lawyer who specializes in corporate liability suits.*

The copy-protection schemes most commonly used will simply tell you that you have an illegitimate copy and refuse to run. I have to disagree with you about the 1-2-3, Release 2, manual, however. The brochure entitled "How to Start 1-2-3 Directly from a Hard Disk" that came with my copy of Release 2 (not through Lotus's upgrade program, I should add) has very clear information about deinstalling and reinstalling. An installed version of Microsoft Word 2.0 can be backed up on diskettes using the PC-DOS BACKUP command and restored to another hard disk with RESTORE, so that copy-protection method is not too bad, either.

I think your main problem, though, is that you have been buying too many copy-protected programs. Some PC users I know absolutely refuse to buy copy-pro-

TECTED programs and have found reasonable (and sometimes better) alternatives. If the marketplace is the only way personal computer users can vote on this issue, then we should say no by basing our purchasing decisions at least partly on the use of copy protection by software manufacturers.

PC users who want to protect their software investment against the more common forms of copy protection can consult PC Magazine, Volume 5 Number 1, page 166 for a list of the various utilities (Copy-II PC is the best-known example) that allow you to make legitimate and legal backups of your disks.

Meanwhile, manufacturers can better protect themselves against software piracy by considering the following novel concepts: (1) better manuals, (2) cheaper software, and (3) more automatic and streamlined update policies and customer support for registered users.

### NON-RE-ENTRANT DOS

I've been writing resident assembly language programs that intercept the BIOS interrupt calls, but with varied success. The major problem seems to arise when I attempt to access any of the DOS Interrupt 21h function calls within a resident program. In particular, I'm trying to do some memory allocation and file I/O, and both of these are failing. If DOS does not allow me to make Interrupt 21h function calls within a resident program, how can I perform memory and file functions?

Another part of my problem is with DEBUG. It often hangs my system when I try to trace through a resident program. Again, I suspect it's part of the same Interrupt 21h problem.

What I really need is more information concerning the inner workings of DOS. Is there any book that goes beyond the mere basics?

Jeffrey Katz  
New Bedford, Massachusetts

*In general, MS-DOS and PC-DOS are "non-reentrant." What this means is that you can't execute a DOS Interrupt 21h call while another one is in progress. The main obstacle is that DOS switches to an internal stack, but even if it did not, some transient data that DOS uses while performing a function call would likely be destroyed by*

*making a second function call before the first was completed.*

Let's take an example. I'll assume your resident program is triggered by a special keyboard combination. While some other application program is currently performing some disk I/O, you trigger the key. At this point, your resident program calls DOS. The internal stack that DOS maintains will now contain your stack instead of the original application program's stack. The resident program's file I/O may work fine. But when the resident program is done and returns control to the program it interrupted, that program is still in the

## ■ A better debugger for resident programs is IBM's Professional Debug Facility.

*middle of its DOS call. DOS cannot properly exit back to the program because the original stack has been altered. In fact, it will probably return to your resident program again. That means it's big red switch time.*

You can try to get around this by intercepting Interrupt 21h to simply set a flag when an application program calls DOS (and reset it when DOS returns to the program). Then, by using this flag, your program can determine if it is safe to use DOS. Early versions of SideKick (those prior to Version 1.5) used this method, often successfully.

Even with this technique, however, you will still have a problem with a segment address that DOS maintains, known as the Current Program Segment Prefix. During some DOS calls, DOS needs to store information about newly opened files in the Program Segment Prefix (PSP) of the program making the DOS call. DOS uses the Current Program Segment Prefix address (stored internally within DOS) to determine which of several possibly loaded programs is the one making the Open File DOS call.

If a resident program were to open a

# You know I can rescue your data.

file without telling DOS that it is the program making the DOS call (by first telling DOS the address of its Program Segment Prefix). Open File information would be then stored in the PSP of the interrupted application program. If that application program were to terminate, DOS would close the file that the resident program had opened.

(The undocumented DOS Function Call 50h sets a new Current PSP from register BX. Function Call 51h returns the Current PSP in BX. In both cases, BX contains a segment address where the program begins, which is the value of the DS register when the program begins to execute. DEBUG, for instance, uses these function calls when switching from its own code to the program it is debugging.)

Allocating memory within a resident program is even trickier, because some memory must be freed up by whatever program is currently running. Most programs grab all available memory, so none is left.

As you have discovered, tracing through a resident program with DEBUG compounds the problem. This is because DEBUG also uses DOS function calls to display to the screen and to read the keyboard. That's why you can't use DEBUG to trace through DOS code. A better debugger for resident programs is IBM's Professional Debug Facility. This is a resident program that generally does not use DOS function calls. The Professional Debug Facility is also much easier to use if you have two displays on your system.

I, too, have been looking for a book that explored the inner workings of PC-DOS (something comparable to David Cortesi's classic *Inside CP/M*), but such a book has yet to be written.

Until that book appears, the best way to learn about the internal workings of DOS is to disassemble both DOS and any resident programs that do something similar to what you want to do. Disassembling is easy, but figuring out what the programs are doing from the naked assembly language code is the hard part. Disassembling the PC-DOS PRINT.COM program is a good place to start. Also check out my PC Tutor column in Volume 4 Number 21 for a summary of the internal workings of PRINT.COM, which uses several undocumented function calls and interrupts to do

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## ■ PC TUTOR

its stuff. Many recent resident programs that need to do disk access have also been "inspired" by the workings of PRINT.

In short, then, you're trying to do one of the most difficult feats in DOS—one that requires crucial information that has been kept undocumented by Microsoft, and one that cries out loudly for a real multitasking operating system. The fact that large software firms with talented programmers still cannot create totally crash-proof resident programs indicates just how tough a problem this is.

### USING 704K INSTEAD OF 640K

I have heard very informally that an IBM PC can address 704K with only the addition of the RAM memory and the appropriate system board switch settings. The memory map in the DOS Technical Reference manual shows the area between 640K and 704K as "reserved." What is it re-

served for? Why haven't memory board manufacturers taken advantage of the extra potential RAM space?

John Reilly  
Winton, California

The area between 640K and 704K is now used by IBM's Enhanced Graphics Adapter (EGA) when it is switched to use the new graphics modes. From the very beginning, IBM reserved this area for display memory. It must have been obvious to them (as it was to many of us) that the Monochrome Adapter and Color/Graphics Adapter just couldn't make it as a long-term optimal display for the PC.

However, it is certainly possible to use that same space for 64K of extra RAM if you don't have an EGA. Some manufacturers (most notably Toll Tree Systems with some of their JRAM boards) have taken advantage of it. You can also try it out

yourself if you have a memory board that can be switched to any address. (Many standard 384K multifunction boards cannot.) Setting the system board switches for the extra memory simply follows the same 32K increments used for memory below 640K. Although I have never tried doing this, I have received same letters from people who have and it looks like a relatively simple trick.

You may also be interested in the expanded memory boards (see "Enlarging the Dimensions of Memory," PC Magazine, Volume 5 Number 1) that use the Lotus/Intel/Microsoft Expanded Memory Specification. Only programs designed to recognize expanded memory can take advantage of it, but Microsoft's promise of DOS support for the specification in future DOS versions makes expanded memory the only currently viable solution to the 640K limit.

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## CHANGING THE LABEL

I am running DOS 2.0, and my question may be answered in later versions of DOS. I would like to change the volume name on a diskette without reformatting. Is this possible or not?

Elbert D. Charpie  
Gadsden, Alabama

Your best move is to try a later DOS version. DOS 3.0 and 3.1 have a new LABEL command that allows you to create, change, or delete the volume label.

In DOS 2.x, however, you can change a volume label by using a program included with The Norton Utilities (Versions 2.0, 3.0, and 3.1). You can also change the volume label directly, using DEBUG. The volume label is located in the root directory of a diskette as a filename with no data. The root directory begins at sector 5 of a 9-sector-per-track diskette. But, unless you

have experience using DEBUG for directly reading and writing disk sectors (in which case I've told you everything you need to know to change the label), I recommend against this method because of the risk involved in destroying parts of the diskette directory or file allocation table.

## COMMAND LINE DELIMITERS

I ran into a strange problem while trying to write a batch file that would get around a limitation on using wildcard characters in the filename parameter of another program. I can demonstrate the problem using a one-line batch file (called TEST.BAT):

REM %1

If I enter TEST X+Y, the batch file displays REM X+Y, as expected. But if I enter TEST X=Y, the batch file displays only REM X. Why is it stopping at the equals sign?

Al Weiss  
San Diego, California

The equals sign, together with the space, comma, semicolon, and tab, is considered a delimiter by COMMAND.COM. If you put the following second line in TEST.BAT

REM %2

the batch file will also display REM Y for your second example. Putting single or double quote signs around the expression (which you'd be tempted to try if you come from a UNIX background) doesn't help either. How you can get around this problem depends upon the application. If you know you'll be getting an equals sign in the parameter, you can reproduce it explicitly within the batch file. Extending your example, you would use something like this:

REM %1=%2

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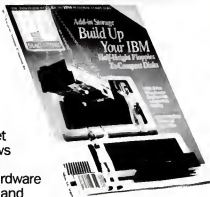
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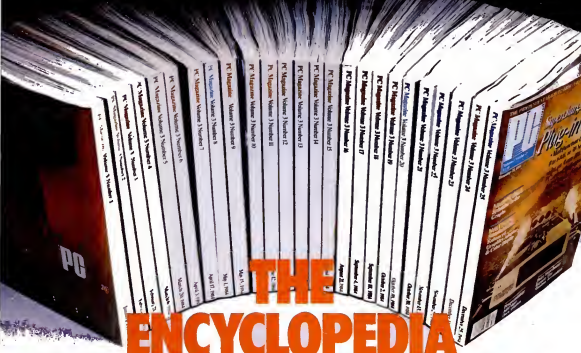
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# REVIEWS IN BRIEF

## Fontastic Output on a Budget

BY ROBIN RASKIN

Using the words "low cost," "desktop publishing," and "IBM" in the same breath will raise any skeptic's eyebrow, but *Fontasy* from Prosoft does it. This \$49.95 package combines an attractive font generation program with 28 built-in type fonts, a simple but adequate drawing program, and some sophisticated page-formatting capabilities to turn a PC into a print shop. Anyone who needs quick, in-house production of flyers, banners, handouts, and newsletter-type documents will enjoy *Fontasy*.

The program comes on two disks, a *Fontasy* disk for basic text file creation and a *LetterSet Design* disk offering the ability to customize fonts and create page format templates. Best of all, *Fontasy* creates your masterpiece in true WYSIWIG fashion, eliminating the dreaded "print and then return to the drawing board" syndrome.

*Fontasy* is a multileveled package; its different components require different degrees of computer savvy. However, even a novice will quickly be able to create attractive text. The selection of typefaces supplied in the basic package (including banner, sideways, calligraphy, and decorative fonts for various holidays) offers a wide range of aesthetic choices. The text design "extras" are easy to use and offer exciting effects. For example, users can magnify their creations (either onscreen or in print), as well as rotate text, cre-

ate mirror images, create proportionally spaced, kerned, and justified text, and assign macros with a minimum of difficulty. During text and graphics creation, users are aided by an undo feature and extensive on-line help. After a few brief sessions, the initially overwhelming combinations of Alt, Ctrl, Esc, and function key commands start making sense.

The draw part of the program offers less gratifying results. You can master the program's simple ovals, rectangles, rubber-band

(continues on next page)

## Bad Software Design Revisited: CADPAK

BY ROBIN RASKIN

Ostensibly, *CADPAK* is an easy-to-use computer-aided drafting and design tool that its makers claim can serve the needs of everyone. In reality, *CADPAK* is not especially easy to use and will only meet your professional needs if you have the patience of a saint. But the most deadly *CADPAK* sin of all is the \$395 price tag. Equivalent graphics packages on the market currently retail for \$25 to \$100.

*CADPAK* has that distinctly BASIC graphics program feel about it. With 640K-bytes of RAM in my machine, the program is so slow that I thought it had crashed when it was simply processing my command to create one endpoint of a line. *CADPAK* gives you a blank drawing window area in which you can draw very basic elements (rubber-band style lines, arcs, circles, and boxes), and text. You draw all elements by specifying endpoints, center points, or corners. A picture is made as a composite of these various elements—no easy feat. You can create multiple drawing sheets, so you are not limited in the size of the display screen, but you are prohibited from ever seeing the whole drawing on-screen at once. With a great deal of fortitude you can create pictures, but the program has built-in roadblocks everywhere.

The worst offender in the program is the user interface. A fraction of the program's commands appear to the right of the drawing window and may be selected with a mouse or keyboard, but the majority of commands must be memorized and typed in at the keyboard, even when you're using a mouse. The commands are also available via Ctrl, Alt, Shift, and function key input, but this annotated process is inconveniently hidden in the documentation, and there is no help screen documenting this approach. Demarcating your chosen points in the drawing process calls for use of the PgUp, Home, Insert, and Delete keys—a scheme with no rationale that interferes with cursor positioning.

It isn't unfair to expect a package costing \$395 to include a symbol library of some sort,



*Fontasy* comes equipped with 28 type fonts to spruce up your documents.



*CADPAK* displays only a small portion of its commands in its on-screen menu.

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containing commonly used drafting notation. The same holds true for the creation of organizational charts, schematics, and other graphics that the program's makers claim the program can do. **CADPAK** does not offer such files. Coupled with the crudeness of the program's primitive shapes, **CADPAK** is a poor choice for anyone who is seriously trying to create a professional-looking drawing in the course of a working day. The time involved in creating a single symbol is not justified.

Limitations abound. While it is possible to size and angle the text in a drawing, there is only one text font, and it is not especially attractive. There is no easy way to draw an oval. The Move command addresses each component of the drawing individually, not the drawing as a whole. Moving an entire drawing is a piecemeal process unless you first save the drawing as a symbol. A move box, allowing you to circle a desired move area, is another one of **CADPAK**'s omissions.

The demo drawings included with the package attest to the program's juvenile output. The 70-page manual has no illustrations or screen shots and manages to complicate every procedure it details. A tutorial section takes 15 exercises in order for you to create a pie-sliced moon that you then move and rotate. There is no other tutorial, nor is there much information on how to use the various levels of drawing sheets or how to create line thicknesses and font sizes.

**CADPAK** supports a mouse and digitizer and only Epson-compatible printers. The mouse is used solely as a pointing device, and its freehand drawing capabilities are ignored. I did not use a digitizer with the program, as it only supports the Houston Instrument DMP and PC Series plotters and the Roland DXY-880 plotter, two of the more obscure plotters on the market. Everytime I think we're beginning to see the attrition of poor software programs, a program like **CADPAK** snaps me back to reality. ■

## Fontasy

(continued from preceding page)

lines, 95 fill patterns and block moves quickly, but you'll be hard-pressed to make any sort of complex artistic statement with these limited features. While the program supports a mouse, the freehand drawing capabilities are limited. Drawing—especially with the keyboard as input device—is tedious and clumsy. Creating a simple pie chart left me exhausted. Some "clip art" is available on the optional font disks, but Prosoft should devote more time to developing this aspect of the program.

Using the program's advanced desktop publishing features is tricky business, best left to advanced users. Special commands (added to the program so recently that they are documented only in a newsletter-style addendum) allow the user to create ASCII format files, which **Fontasy** transforms into formatted pages (using either the program's predefined or your own customized page layout templates). These desktop publishing functions accommodate sophisticated layouts including multiple columns, variable margins, and the flowing of text around marked areas. Combined with its support of the HP Laserjet (and substantial user perseverance), these **Fontasy** features can crank out very professional-looking results.

**Fontasy** is a lot of package for the money. The 200-page manual is chock-full of goodies

designed to keep the playful explorer busily occupied for months. While it doesn't offer as simple or straightforward a creation process as Springboard's popular **Newsroom** program, **Fontasy** offers more flexibility. Judging from the voluminous addendum to the manual, the availability of extra font disks, and enthusiastic customer support, it appears Prosoft is hell-bent on growing with its users. Unlike **Newsroom**, which is a complete package unto itself, **Fontasy** can be expected to grow in usefulness. ■



## FACT FILE

### Fontasy

Prosoft  
7248 Bellaire Ave.  
P.O. Box 560  
N. Hollywood, CA 91603  
(818) 764-4555  
List Price: \$49.95

Requires: 256K RAM (partial-page images), 448K (full-page images), one disk drive, DOS 2.0 or later, color/graphics adapter, dot matrix printer. Mouse optional  
In Short: A low-cost graphics and font generator with page makeup capabilities for producing print-shop-like newsletters.

CIRCLE 632 ON READER SERVICE CARD

## Electra-Find: A Handy Way to Retrieve the Right Files

BY GLENN HART

File-searching programs like **ZyINDEX**, **FYI 3000**, IBM's **Office Correspondence Retrieval System (OCRS)**, and **4-1-1** form a hot new software category. These programs process text files to create special index files. A word or group of words can then be located quickly, which can be tremendously helpful in finding the files that refer to a given subject. This is especially useful when large numbers of text files reside on a hard disk. The DOS limit on the length of filenames often results in cryptic designations that made sense when they were created but seem meaningless weeks or months later.

While the indexing method used by these programs allows fast location of the desired text string, it sometimes also exacts a heavy price. Even though so-called noise words are excluded, the index files themselves can grow very large. Most programs also merely point out where the located text is; the file itself must be examined to determine context.

**Electra-Find** is a text-retrieval program that works in a fashion similar to indexing software but offers some significant advantages over even sophisticated **ZyINDEX**-type software. It works on existing files without requiring an indexing step or any special file formatting. The files to be searched can be specified with wildcards or by selecting or excluding a group of files from a disk's directory. **Electra-Find** creates an output file containing the results of the search, and this file can be displayed or printed from within the program or from DOS.

The text to search for can contain control characters as well as standard text. Boolean searches can find a list of up to 40 words or phrases (the list is created with any text editor or word processor). Options can restrict the search to an exact match, allow use of wildcards in the search string, and even perform a phonetic search that will locate words that sound similar to the supplied word.

Other options convert non-ASCII characters by turning off the high bit (useful for



## FACT FILE

### CADPAK 1.1

CADPAK Software  
955 Dairy Ashford, #122  
Houston, Texas 77079  
(713) 870-9795  
List Price: \$395

Requires: 256K RAM, DOS 2.0 or later.  
Mouse or digitizer is recommended.

In Short: A very simple computer-aided drafting and design program; however, the user interface is not very good and is difficult to use.

CIRCLE 630 ON READER SERVICE CARD



WordStar files) or removing nonprinting characters entirely, remove hyphens at the end of lines, ignore the normal end-of-file character to allow searching binary files, and insert line numbers before each extraction. A Context Limits command sets the amount of text extracted to words, sentences, paragraphs, or specified delimiter characters (useful for extracting functions surrounded by braces in a C program, for example).

*Electra-Find* requests the search string, the file list to search, and the name for the output file. The various options are selected with control characters. This menu system is easy to use, and context-sensitive on-line help is available at any time. Alternatively, *Electra-Find* can be run directly from DOS, bypassing the menu system; this allows *Electra-Find* commands to be included in DOS batch files.

The program performed flawlessly in my

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## FACT FILE

### *Electra-Find*

O'Neill Software

P.O. Box 26111

San Francisco, CA 94126

(415) 398-2255

List Price: \$65

Requires: DOS 2.x, 64K RAM; DOS 3.0 or later, 96K RAM; one disk drive.

**In Short:** A text-retrieval system that works on existing ASCII files without indexes or special formatting.

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tests. The main tradeoff compared to indexing programs is speed of searching against the time required and space consumed by the index process. Disk speed is a primary determinant of search speed. On my 8-MHz PC AT with a fast Tallgrass 80-megabyte hard disk, though, retrieval speed was more than acceptable. Searching a group of files totaling about 100K bytes took 27.3 seconds on a RAMdisk, 28.3 seconds on the Tallgrass, and 49.7 seconds on a 360K-hyde floppy.

Obviously, there are pros and cons to *Electra-Find*'s lack of index files. Eliminating the time-consuming indexing process and the disk space occupied by an index file is worthwhile, but the speed loss may be significant with very large groups of files to search or on slower computers. Indexing programs can also locate text in files that are no longer stored on-line. Yet I found *Electra-Find*'s approach very comfortable. It is much easier to construct ad-hoc searches without having to index files first. *Electra-Find* is useful, flexible, and very reasonably priced. ■

## A Mail Order Risk Worth Taking

BY JIM FORNEY

Two rugged cartons firmly taped together arrived at my door one morning recently. After months of looking at the many ads for bargain-priced hard disks, I finally settled on the 20-megabyte full-height model offered via mail-order by PC's Limited. Having bought everything from RAM chips to major hardware purchases from various mail-order houses in more reckless days—with varying degrees of success ranging from satisfaction to downright misery—I must admit to some

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degree of lingering apprehension. But the professional way the disk drive and controller board were packaged for shipping went a long way toward increasing my confidence even before I got down to the serious business of installing them.

Far from being some no-name "brand X" or discontinued model, as one might have suspected from the selling price, the PC's Limited full-height drive I'd purchased was in fact one currently produced by Seagate, one of the better-known original equipment manufacturers (OEM) of hard disks. The installation process had been professionally reduced to a simple, nearly foolproof, and really satisfying procedure.

Aside from the time spent removing the cover of my PC, installation of the new controller board—a Xebec board that combines both hard disk and floppy controllers, freeing up a slot—took less than 5 minutes. To check myself at this point in the process, I booted the system with a floppy connected to this board. It worked perfectly.

I took a short break, then quickly installed the hard disk. And I do mean quickly. Two foolproof connectors from the controller board and one from the power supply installed, two screws, and I was ready to go. Total elapsed time, including break, was under a half-hour.

According to the documentation, PC's Limited physically formats its hard disk before shipping. Nevertheless, I still ran the DOS FDISK and FORMAT programs just to play it safe. The procedure is well documented, and PC's Limited includes a disk of software utilities for special situations. Within an hour after I'd started, I booted my system from my new hard disk and was off and running. I now know why hard disk users considered my previous configuration obsolete.

It still isn't an AT and couldn't keep up with one for love or money. But my garden-variety IBM PC took a giant step up with the addition of the 20-megabyte hard disk. It can now handle just about any job I need it for—and for a lot less than an AT.



## FACT FILE

## 20-Megabyte Half-Height Hard Disk

PC's Limited  
1611 Headway Circle, Bldg. 3  
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(800) 426-5150

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## GURU—AN EXPERT SYSTEM THAT MEANS BUSINESS

With its *Guru* expert system, MDBS, maker of the *KnowledgeMan* database management package, claims to have raised microcomputer artificial intelligence to a new level of consciousness. Business consciousness, that is. Testing this complicated program wasn't easy. But PC Labs found a way to get you answers.

## CORE'S NEW 250-MEGABYTE HARD DISK

The ongoing quest for bigger and faster mass storage for the AT has produced a breakthrough—the Core HC25. This wonder disk holds a quarter of a gigabyte of data and breaks all speed records for access time. How did Core do it? By combining the very latest in hard disk technology with a complete overhaul of the way DOS looks at the disk.

## DESKTOP ORGANIZERS

The PC may take up a lot of desktop space, but not when you consider the standard office equipment it can replace there. Put your old Rolodex, calendar, clock, calculator, and notepad out to pasture, and check out these five desktop organizer programs.

## TANDY ENTERS THE PC AT-COMPATIBLE RING

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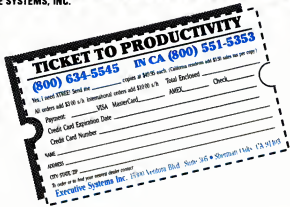


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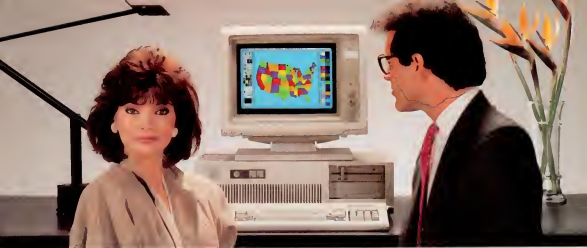
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